SUPPLEMENT

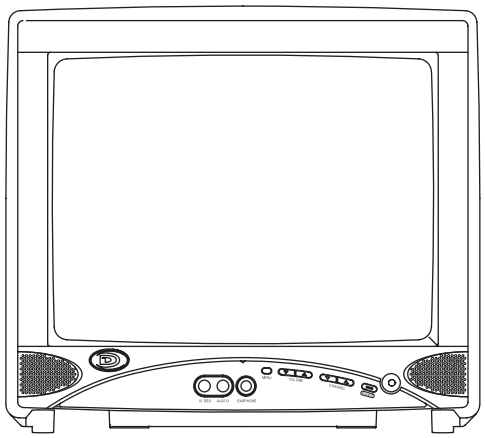
DURABRAND

SERVICE MANUAL

This service manual shows only the differences between the model DWT1304 and the original model ST413E. All other information is described in the service manual of the model ST413E.

13” COLOR TELEVISION

DWT1304



Different parts from original model (ST413E)

Ref. No.	Description	Part No.
A1	FRONT CABINET L2204UE	0EM000886
A2	CONTROL PLATE L2204UE	0EM302049
A4⚠	RATING LABEL L2204UE	----------
A-5	BRAND BADGE L2204UE	0EM408903
B3	Not Used	
S1	CARTON L2204UE	0EM408906
S6	SERIAL NO. LABEL L2204UE	----------
S7	LABEL, EAS(H3761UD) MAKER NO.ZLLFNSLE1	0VM410203
X1⚠	OWNER'S MANUAL(E)/(S) L2204UE:ENGLISH/SPANISH	0EMN02372
X2	REMOTE CONTROL NE142UD or	NE142UD
	REMOTE CONTROL NE154UD	NE154UD
X4	Not Used	
X-4	SHEET RETURN STOP L2204UE	0EM408998

SUPPLEMENT

Symphonic SYLVANIA DURABRAND

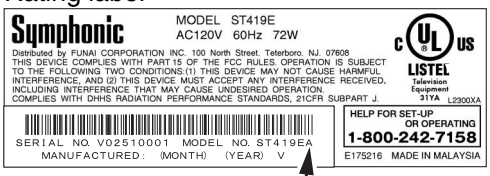
SERVICE MANUAL

Subject: Change of IF Signal Process IC

This service manual supplement is for the ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model, which are different from the previous ST413E/6413TE/DWT1304/ST419E/6419TE model. For the ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model, an "A" has been added to the end of the model number on rating label in the rear. Refer to the rating label illustration at right.

Example: ST419E

Rating label

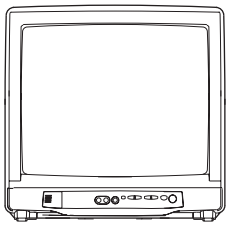

Symphonic
MODEL ST419E
AC120V 60Hz 72W
Distributed by FUNAI CORPORATION INC. 100 North Street. Teterboro, NJ. 07608
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.
COMPLIES WITH DHHS RADIATION PERFORMANCE STANDARDS, 21CFR SUBPART J.
c UL us
LISTEL
Television Equipment
31YA L2300XA
SERIAL NO. V02510001 MODEL NO. ST419EA
MANUFACTURED: (MONTH) (YEAR) V
HELP FOR SET-UP OR OPERATING
1-800-242-7158
E175216 MADE IN MALAYSIA

Suffix "A"

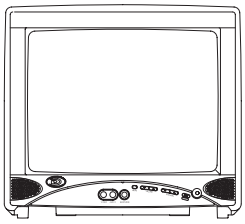
This service manual shows only the differences between the model ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model and the previous ST413E/6413TE/DWT1304/ST419E/6419TE model. All other information is described in the service manual of the previous ST413E/6413TE/DWT1304/ST419E/6419TE model.

13″ COLOR TELEVISION

ST413E/6413TE

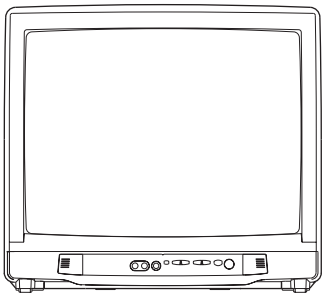


DWT1304



19″ COLOR TELEVISION

ST419E/6419TE



IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all Funai Equipment. The service procedures recommended by Funai and described in this service manual are effective methods of performing service operations. Some of these service special tools should be used when and as recommended.

It is important to note that this service manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Funai could not possibly know, evaluate and advice the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Funai has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Funai must first use all precautions thoroughly so that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

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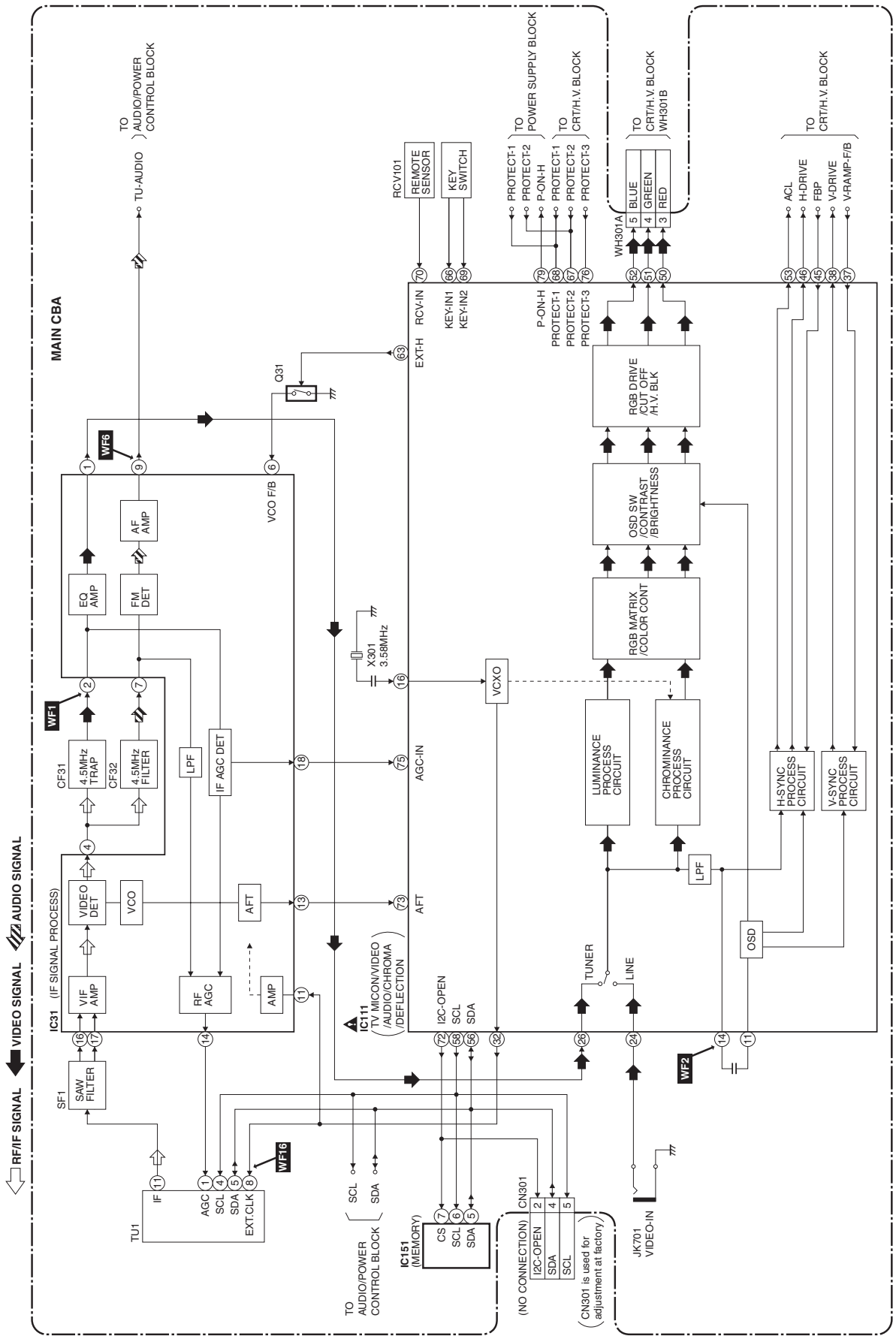
BLOCK DIAGRAMS

IF/Video/System Control Block Diagram



SCHEMATIC DIAGRAMS / CBA'S AND TEST POINTS

Standard Notes

Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by the mark " ⚠ " in the schematic diagram and the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

Note:

1. Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
2. All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
3. Resistor wattages are 1/4W or 1/6W unless otherwise specified.
4. All capacitance values are indicated in μF ($P=10^{-6}$μF).
5. All voltages are DC voltages unless otherwise specified.

Note of Capacitors:

ML --- Mylar Cap. PP --- Metallized Film Cap. SC --- Semiconductor Cap. L --- Low Leakage type

Temperature Characteristics of Capacitors are noted with the following:

B --- ±10% CH --- 0±60ppm/°C CSL --- +350~-1000ppm/°C

Tolerance of Capacitors are noted with the following:

Z --- +80~-20%

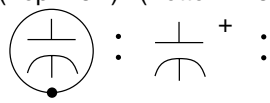
Note of Resistors:

CEM --- Cement Res. MTL --- Metal Res. F --- Fuse Res.

Capacitors and transistors are represented by the following symbols.

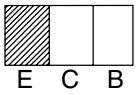
CBA Symbols

(Top View) (Bottom View)



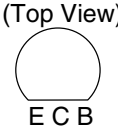
Electrolytic Capacitor

(Bottom View)



Transistor or Digital Transistor

(Top View)

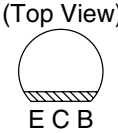


NPN Transistor

(Top View)

PNP Transistor

(Top View)



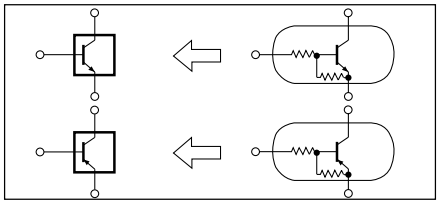
NPN Digital Transistor

(Top View)

PNP Digital Transistor

Schematic Diagram Symbols

Digital Transistor



LIST OF CAUTION, NOTES, AND SYMBOLS USED IN THE SCHEMATIC DIAGRAMS ON THE FOLLOWING PAGES:

1. **CAUTION:** FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE_A,_V FUSE.
   ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE_A,_V.

2. **CAUTION:**

   Fixed Voltage (or Auto voltage selectable) power supply circuit is used in this unit.
   If Main Fuse (F601) is blown, first check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

3. **Note:**

   (1) Do not use the part number shown on the drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since the drawings were prepared.

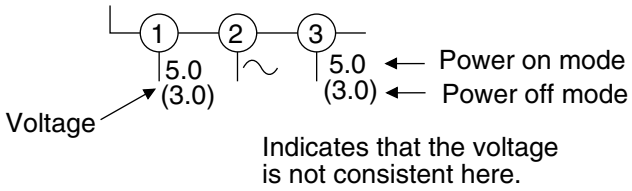
   (2) To maintain original function and reliability of repaired units, use only original replacement parts which are listed with their part numbers in the parts list section of the service manual.

4. **Wire Connectors**

   (1) Prefix symbol "CN" means "connector" (can disconnect and reconnect).

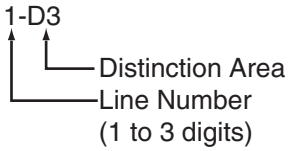
   (2) Prefix symbol "CL" means "wire-solder holes of the PCB" (wire is soldered directly).

5. **Voltage indications on the schematics are as shown below:**
   Plug the TV power cord into a standard AC outlet.:

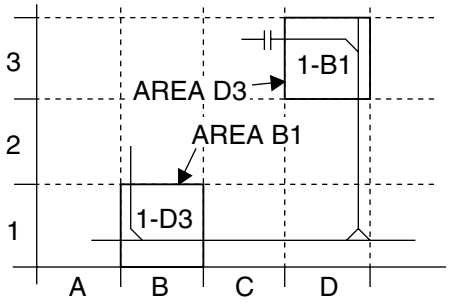


Unit: Volts

6. **How to read converged lines**



Examples:
1. "1-D3" means that line number "1" goes to the line number "1" of the area "D3".
2. "1-B1" means that line number "1" goes to the line number "1" of the area "B1".



7. **Test Point Information**

   : Indicates a test point with a jumper wire across a hole in the PCB.

   : Used to indicate a test point with a component lead on foil side.

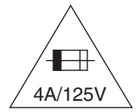
   : Used to indicate a test point with no test pin.

   : Used to indicate a test point with a test pin.

Main 2/3 Schematic Diagram

CAUTION !

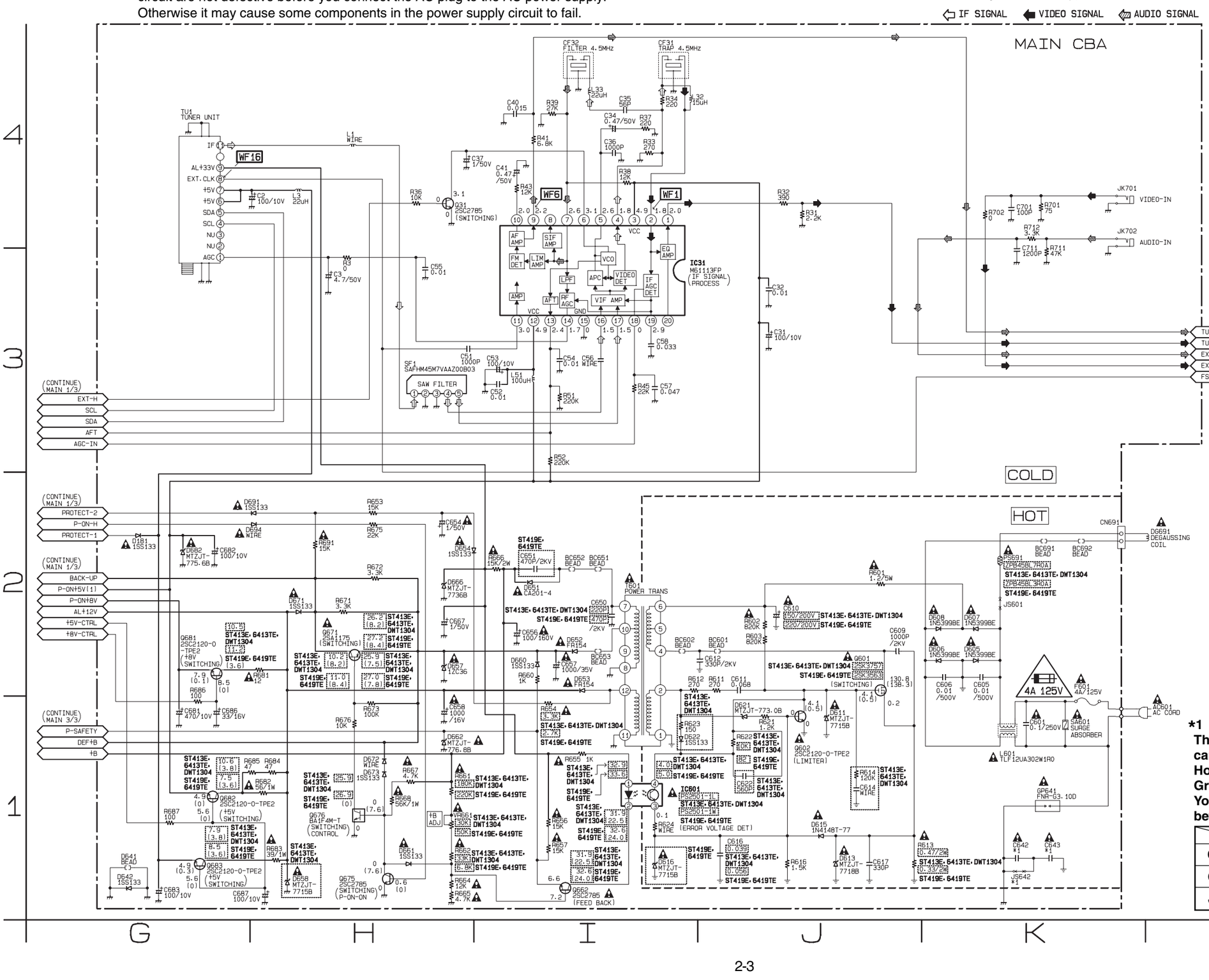
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.



CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.

ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



MAIN 2/3

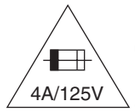
Ref No.	Position
ICS	
IC31	I-3
IC601	I-1
TRANSISTORS	
Q31	H-4
Q601	J-2
Q602	J-1
Q662	I-1
Q671	H-2
Q675	H-1
Q676	H-1
Q681	G-2
Q682	G-1
Q683	G-1
CONNECTOR	
CN691	K-2
VARIABLE RESISTOR	
VR661	H-1

***1 NOTE:**
These components (C643, C642, JS642) can be used in any models.
However, you cannot mix components under Group A with the ones under Group B.
You can choose either Group. The difference between Group A and Group B is shown below.

	Group A	Group B
C643	0.01/250V	4700P/250V
C642	0.01/250V	Not Used
JS642	Not Used	WIRE

Main CBA Top View

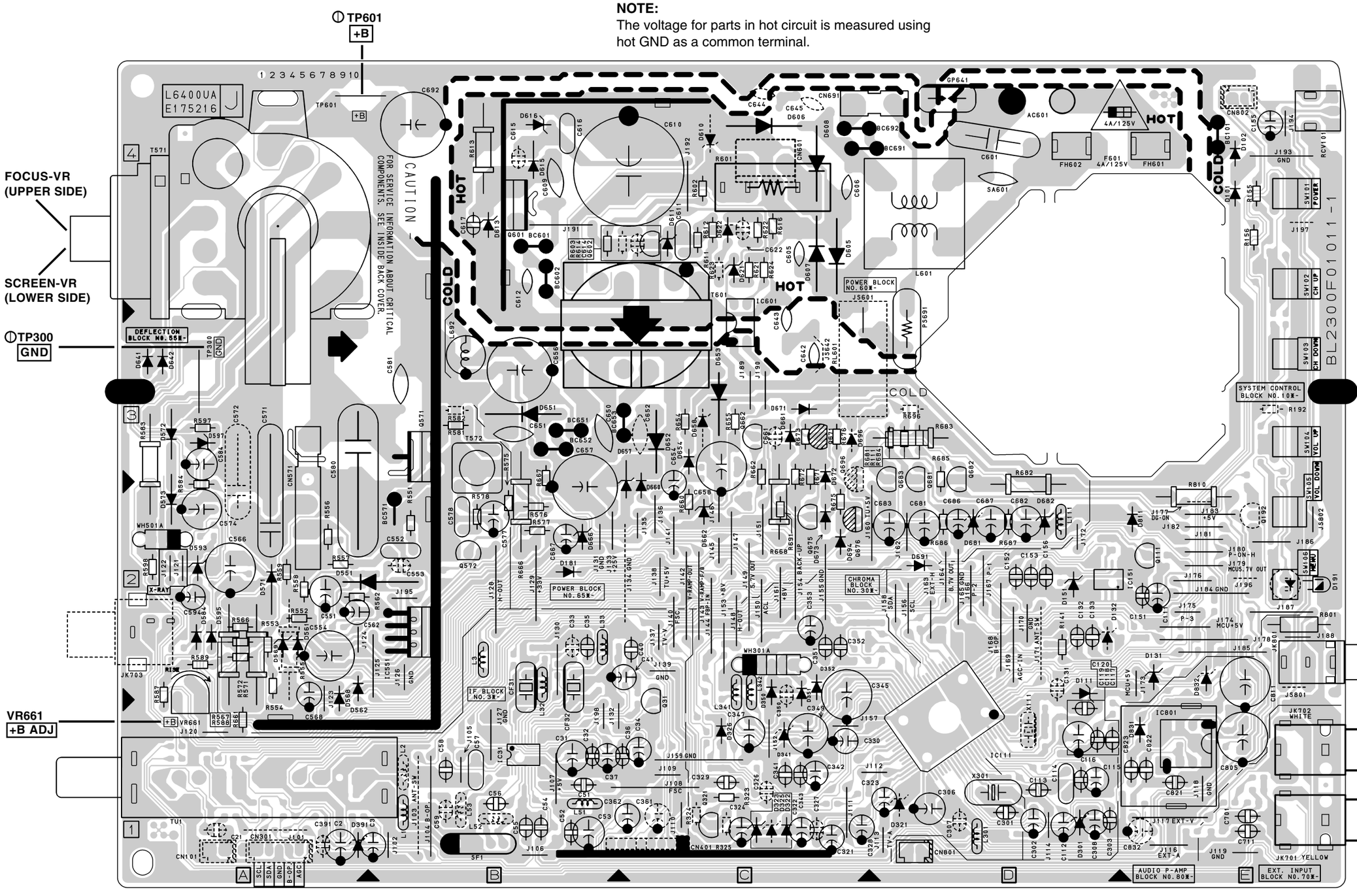
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.



CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.
ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

Because a hot chassis ground is present in the power supply circuit, an isolation transformer must be used. Also, in order to have the ability to increase the input slowly,when troubleshooting this type power supply circuit, a variable isolation transformer is required.

NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



MAIN CBA

Ref No.	Position
ICS	
IC31	B-1
IC111	D-1
IC151	E-2
IC551	B-2
IC601	C-4
IC801	E-1
TRANSISTORS	
Q31	C-1
Q111	E-2
Q321	C-1
Q571	B-3
Q572	B-2
Q601	B-4
Q602	B-4
Q662	C-3
Q671	C-3
Q675	C-2
Q676	C-2
Q681	D-3
Q682	D-3
Q683	D-3
CONNECTORS	
CN571	A-3
CN691	C-4
CN801	D-1
WH301A	C-2
WH501A	A-2
TEST POINTS	
TP300	A-3
TP601	A-4
VARIABLE RESISTOR	
VR661	A-1

Main CBA Bottom View

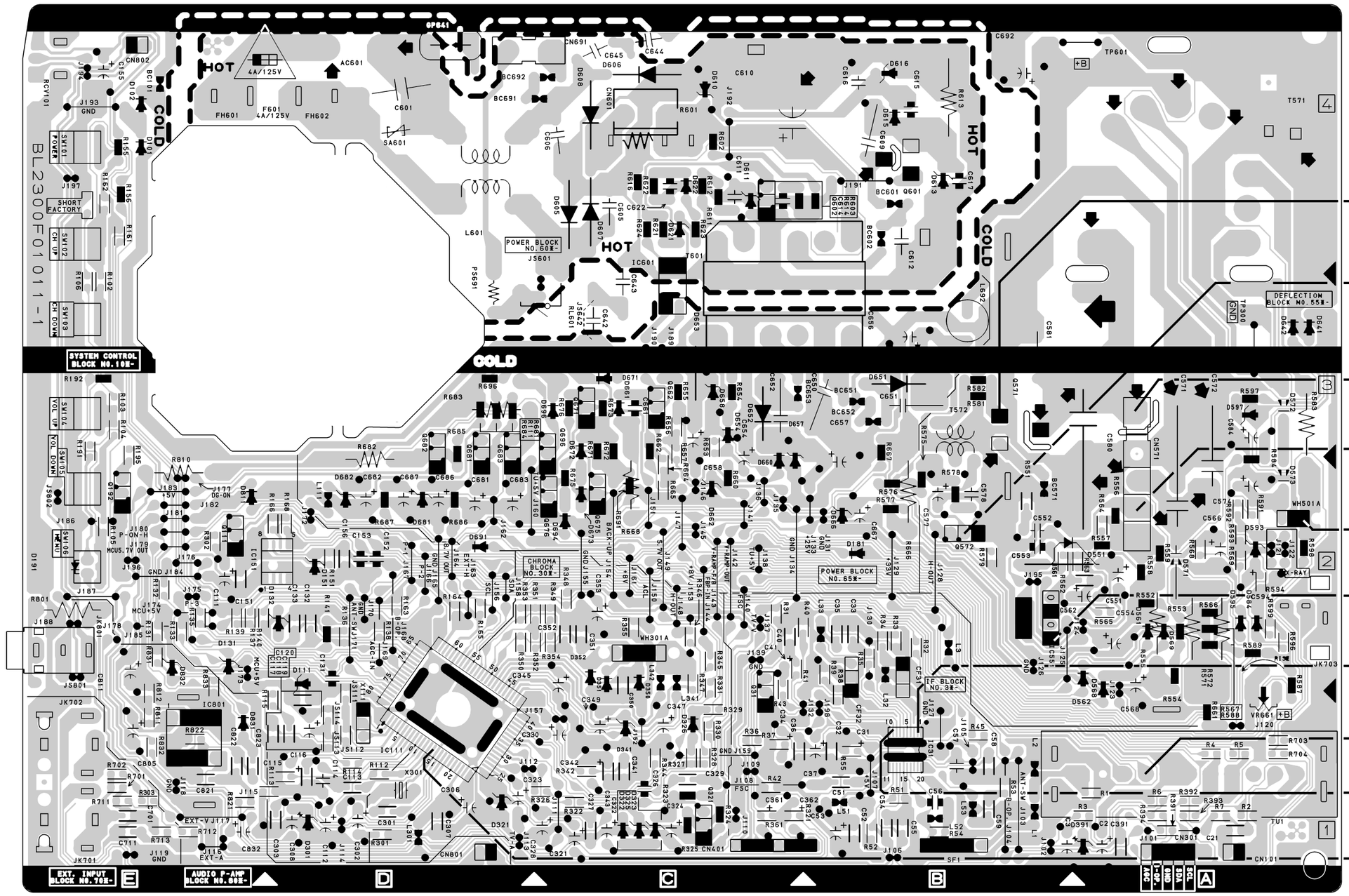
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit. If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.
ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

Because a hot chassis ground is present in the power supply circuit, an isolation transformer must be used. Also, in order to have the ability to increase the input slowly,when troubleshooting this type power supply circuit, a variable isolation transformer is required.

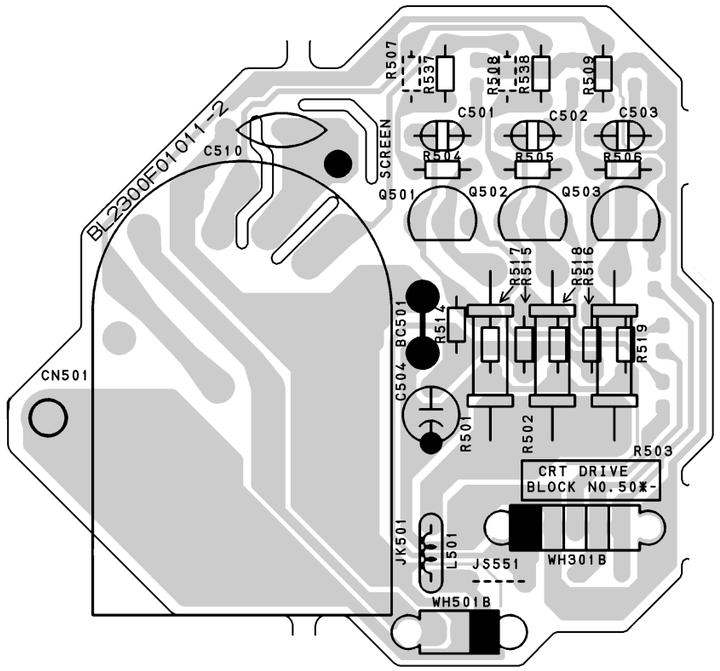
NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



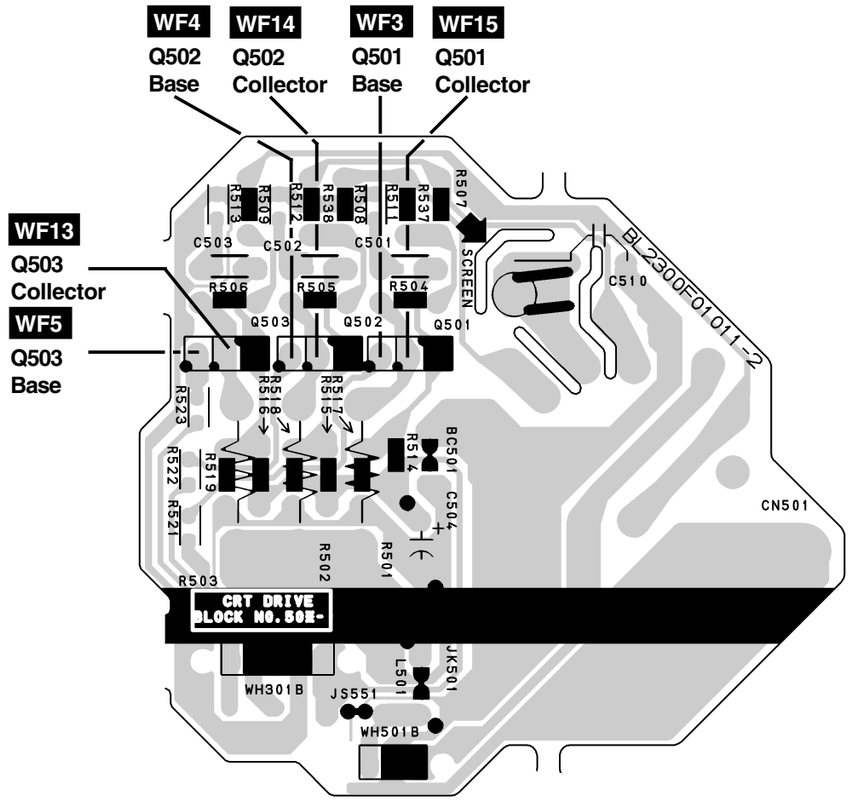
CRT CBA Top View

CRT CBA

Ref No.	Position
TRANSISTORS	
Q501	B-2
Q502	B-2
Q503	B-2
CONNECTORS	
CN501	A-1
WH301B	B-1
WH501B	B-1



CRT CBA Bottom View



ST413E changed IC model

Different parts from the previous version model (ST413E)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2200XA	----------
S6	SERIAL NO. LABEL L2200XA	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

6413TE changed IC model

Different parts from the previous version model (6413TE)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2201XB	----------
S6	SERIAL NO. LABEL L2201XB	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

DWT1304 changed IC model

Different parts from the previous version model (DWT1304)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2204XE	----------
S6	SERIAL NO. LABEL L2204XE	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

ST419E changed IC model

Different parts from the previous version model (ST419E)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2300XA	----------
S6	SERIAL NO. LABEL L2300XA	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05979
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

6419TE changed IC model

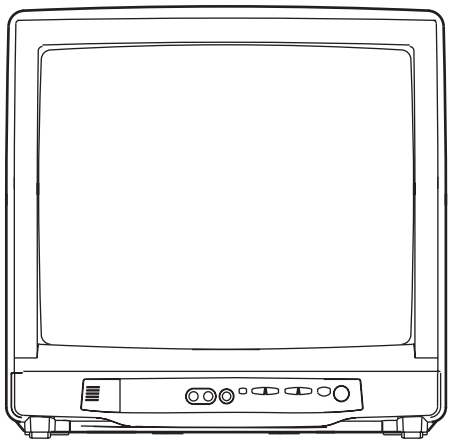
Different parts from the previous version model (6419TE)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2301XB	----------
S6	SERIAL NO. LABEL L2301XB	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05979
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

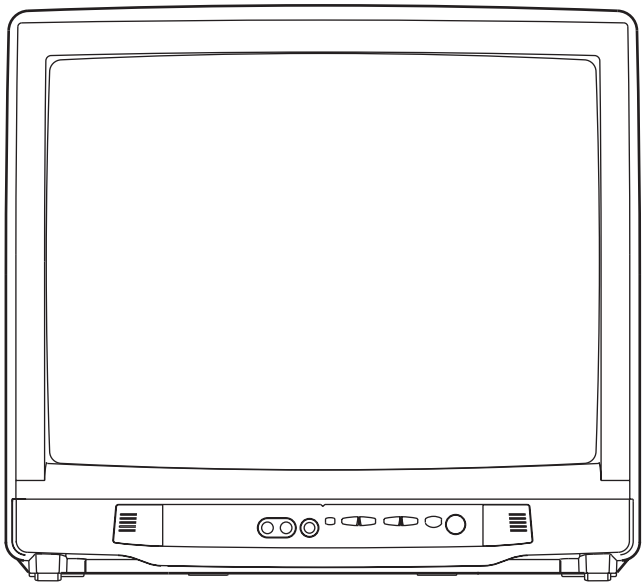
Symphonic

SERVICE MANUAL

13” COLOR TELEVISION
ST413E



19” COLOR TELEVISION
ST419E



IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all Funai Equipment. The service procedures recommended by Funai and described in this service manual are effective methods of performing service operations. Some of these service special tools should be used when and as recommended.

It is important to note that this service manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Funai could not possibly know, evaluate and advice the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Funai has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Funai must first use all precautions thoroughly so that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

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SPECIFICATIONS

<TUNER>

ANT. Input ---------- 75ohm Unbal., F type
Reference Level----------20Vp-p (CRT Green Cathode)
Test Input Signal ----------400Hz 30% modulation

Description	Condition	Unit	Nominal	Limit
1. Intermediate Freq.	Picture Sound	MHz MHz	45.75 41.25	- -
2. Peak Picture Sens	VHF CATV UHF	dBμv dBμv dBμv	15 15 15	30 30 40
3. AFT Pull In Range (10mV input)	-	MHz	±2.0	±0.7

<DEFLECTION>

[ST413E]

Description	Condition	Unit	Nominal	Limit
1. Deflection Freq.	Horizontal Vertical	KHz Hz	15.734 60	- -
2. Linearity	Horizontal Vertical	% %	- -	±15 ±10
3. Over Scan	-	%	10	-
4. High Voltage	-	KV	23	-

[ST419E]

Description	Condition	Unit	Nominal	Limit
1. Deflection Freq.	Horizontal Vertical	KHz Hz	15.734 60	- -
2. Linearity	Horizontal Vertical	% %	- -	±15 ±10
3. Over Scan	-	%	10	-
4. High Voltage	-	KV	26	-

<VIDEO & CHROMA>

[ST413E]

Description	Condition	Unit	Nominal	Limit
1. Misconvergence	Center Side Corner	mm mm mm	- - -	0.3 1.2 1.5
2. Brightness	APL 100%	Ft-L	60	40
3. Color Temperature	-	°K	9200°K	-
4. Resolution	Horizontal Vertical	Line Line	250 300	- -

[ST419E]

Description	Condition	Unit	Nominal	Limit
1. Misconvergence	Center Side Corner	mm mm mm	- - -	0.4 1.5 2.1
2. Brightness	APL 100%	Ft-L	40	25
3. Color Temperature	-	°K	9200°K	-
4. Resolution	Horizontal Vertical	Line Line	250 300	- -

<AUDIO>

All items are measured across 8Ω load at speaker output terminal.

Description	Condition	Unit	Nominal	Limit
1. Audio Output Power	10% THD	W	1	0.8
2. Audio Distortion (w/LPF)	500mW	%	2	7
3. Audio Freq. Response	–3dB	Hz	100~11K	-

Note:
Nominal specifications represent the design specifications. All units should be able to approximate these. Some will exceed and some may drop slightly below these specifications. Limit specifications represent the absolute worst condition that still might be considered acceptable. In no case should a unit fail to meet limit specifications.

IMPORTANT SAFETY PRECAUTIONS

Prior to shipment from the factory, our products are strictly inspected for recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

Safety Precautions for TV Circuit

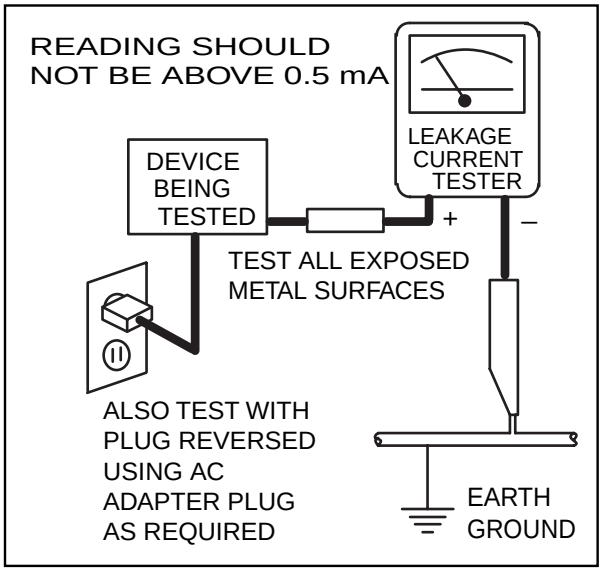
1. **Before returning an instrument to the customer,** always make a safety check of the entire instrument, including, but not limited to, the following items:

a. Be sure that no built-in protective devices are defective and have been defeated during servicing. (1) Protective shields are provided on this chassis to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience. (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features or fail to perform safety checks may be liable for any resulting damage.**

b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, (1) spacing between the picture tube and the cabinet mask, (2) excessively wide cabinet ventilation slots, and (3) an improperly fitted and/or incorrectly secured cabinet back cover.

c. **Antenna Cold Check -** With the instrument AC plug removed from any AC source, connect an electrical jumper across the two AC plug prongs. Place the instrument AC switch in the on position. Connect one lead of an ohmmeter to the AC plug prongs tied together and touch the other ohmmeter lead in turn to each tuner antenna input exposed terminal screw and, if applicable, to the coaxial connector. If the measured resistance is less than 1.0 megohm or greater than 5.2 megohm, an abnormality exists that must be corrected before the instrument is returned to the customer. Repeat this test with the instrument AC switch in the off position.

d. **Leakage Current Hot Check -** With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1410, (50.7). With the instrument AC switch first in the on position and then in the off position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinet, screw heads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milli-ampere. Reverse the instrument power cord plug in the outlet and repeat the test.



ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER OR BEFORE CONNECTING THE ANTENNA OR ACCESSORIES.

e. **X-Radiation and High Voltage Limits -** Because the picture tube is the primary potential source of X-radiation in solid-state TV receivers, it is specially constructed to prohibit X-radiation emissions. For continued X-radiation protection, the replacement picture tube must be the same type as the original. Also, because the picture tube shields and mounting hardware perform an X-radiation protection function, they must be correctly in place. High voltage must be measured each time servic-

ing is performed that involves B+, horizontal deflection or high voltage. Correct operation of the X-radiation protection circuits also must be reconfirmed each time they are serviced. (X-radiation protection circuits also may be called "horizontal disable" or "hold down.") Read and apply the high voltage limits and, if the chassis is so equipped, the X-radiation protection circuit specifications given on instrument labels and in the Product Safety & X-Radiation Warning note on the service data chassis schematic. High voltage is maintained within specified limits by close tolerance safety-related components/adjustments in the high-voltage circuit. If high voltage exceeds specified limits, check each component specified on the chassis schematic and take corrective action.

2. Read and comply with all caution and safety-related notes on or inside the receiver cabinet, on the receiver chassis, or on the picture tube.

3. Design Alteration Warning - Do not alter or add to the mechanical or electrical design of this TV receiver. Design alterations and additions, including, but not limited to circuit modifications and the addition of items such as auxiliary audio and/or video output connections, might alter the safety characteristics of this receiver and create a hazard to the user. Any design alterations or additions will void the manufacturer's warranty and may make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4. Picture Tube Implosion Protection Warning - The picture tube in this receiver employs integral implosion protection. For continued implosion protection, replace the picture tube only with one of the same type number. Do not remove, install, or otherwise handle the picture tube in any manner without first putting on shatterproof goggles equipped with side shields. People not so equipped must be kept safely away while picture tubes are handled. Keep the picture tube away from your body. Do not handle the picture tube by its neck. Some "in-line" picture tubes are equipped with a permanently attached deflection yoke; because of potential hazard, do not try to remove such "permanently attached" yokes from the picture tube.

5. Hot Chassis Warning -

a. Some TV receiver chassis are electrically connected directly to one conductor of the AC power cord and maybe safety-serviced without an isolation transformer only if the AC power plug is inserted so that the chassis is connected to the ground side of the AC power source. To confirm that the AC power plug is inserted correctly, with an AC voltmeter, measure between the chassis and a known earth ground. If a voltage reading in excess of 1.0V is obtained, remove and reinsert the AC power plug in the opposite polarity and again measure the voltage potential between the chassis and a known earth ground.

b. Some TV receiver chassis normally have 85V AC(RMS) between chassis and earth ground regardless of the AC plug polarity. This chassis can be safety-serviced only with an isolation transformer inserted in the power line between the receiver and the AC power source, for both personnel and test equipment protection.

c. Some TV receiver chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is not isolated from the AC power line. The two ground systems are electrically separated by insulation material that must not be defeated or altered.

6. Observe original lead dress. Take extra care to assure correct lead dress in the following areas:a. near sharp edges,b. near thermally hot parts-be sure that leads and components do not touch thermally hot parts,c. the AC supply,d. high voltage, and,e. antenna wiring. Always inspect in all areas for pinched, out of place, or frayed wiring. Check AC power cord for damage.

7. Components, parts, and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts, or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

8. Product Safety Notice - Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc.. Parts that have special safety characteristics are identified by a (⚠) on schematics and in parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire, and/or other hazards. The product's safety is under review continuously and new instructions are issued whenever appropriate. Prior to shipment from the factory, our products are strictly inspected to confirm they comply with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

Precautions during Servicing

A. Parts identified by the (⚠) symbol are critical for safety.
Replace only with part number specified.

B. In addition to safety, other parts and assemblies are specified for conformance with regulations applying to spurious radiation. These must also be replaced only with specified replacements.

Examples: RF converters, RF cables, noise blocking capacitors, and noise blocking filters, etc.

C. Use specified internal wiring. Note especially:

1) Wires covered with PVC tubing
2) Double insulated wires
3) High voltage leads

D. Use specified insulating materials for hazardous live parts. Note especially:

1) Insulation Tape
2) PVC tubing
3) Spacers
4) Insulators for transistors.

E. When replacing AC primary side components (transformers, power cord, etc.), wrap ends of wires securely about the terminals before soldering.

F. Observe that the wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

G. Check that replaced wires do not contact sharp edged or pointed parts.

H. When a power cord has been replaced, check that 5~6 kg of force in any direction will not loosen it.

I. Also check areas surrounding repaired locations.

J. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

K. Crimp type wire connector

The power transformer uses crimp type connectors which connect the power cord and the primary side of the transformer. When replacing the transformer, follow these steps carefully and precisely to prevent shock hazards.
Replacement procedure

1) Remove the old connector by cutting the wires at a point close to the connector.
Important: Do not re-use a connector (discard it).
2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
4) Use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

L. When connecting or disconnecting the internal connectors, first, disconnect the AC plug from the AC supply outlet.

Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Clearance Distance

When replacing primary circuit components, confirm specified clearance distance (d) and (d') between soldered terminals, and between terminals and surrounding metallic parts. (See Fig. 1)

Table 1 : Ratings for selected area

AC Line Voltage	Region	Clearance Distance (d) (d')
110 to 130 V	USA or CANADA	≥ 3.2 mm (0.126 inches)

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

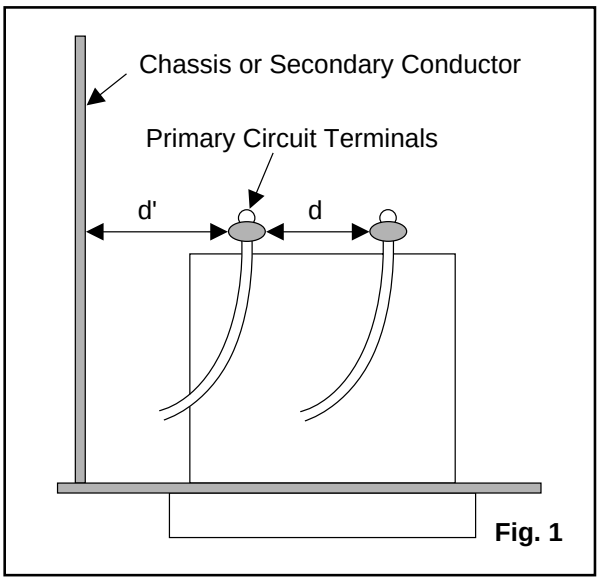


Fig. 1

2. Leakage Current Test

Confirm the specified (or lower) leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) is lower than or equal to the specified value in the table below.

Measuring Method : (Power ON)

Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See Fig. 2 and following table.

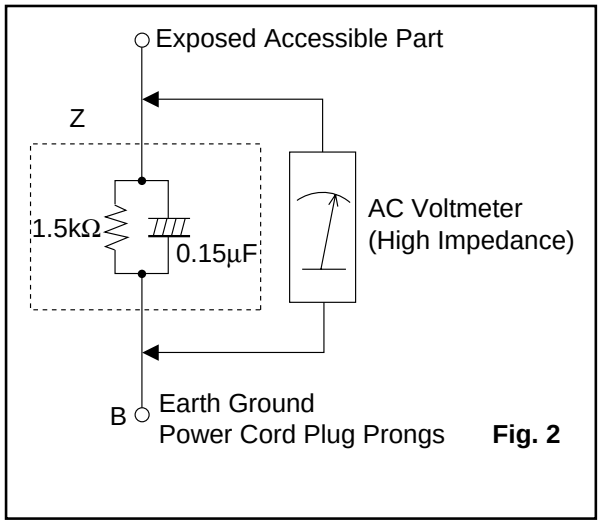


Fig. 2

Table 2 : Leakage current ratings for selected areas

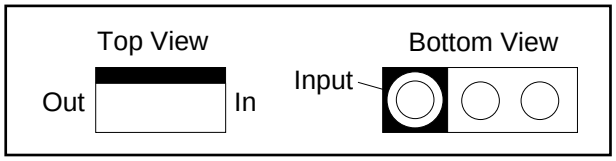
AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (B) to:
110 to 130 V	USA	0.15µF CAP. & 1.5kΩ RES. connected in parallel	i≤0.5mA rms	Exposed accessible parts

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

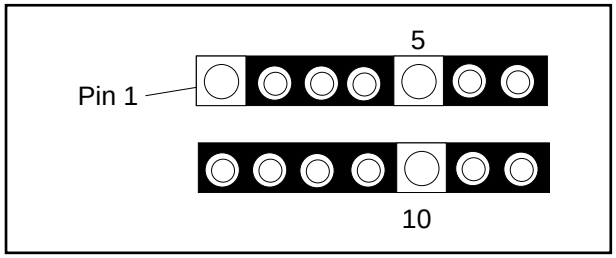
STANDARD NOTES FOR SERVICING

Circuit Board Indications

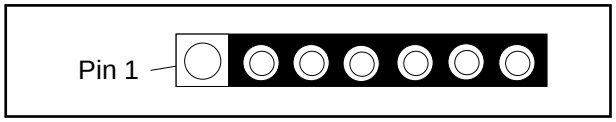
a. The output pin of the 3 pin Regulator ICs is indicated as shown.



b. For other ICs, pin 1 and every fifth pin are indicated as shown.



c. The 1st pin of every male connector is indicated as shown.



How to Remove / Install Flat Pack-IC

1. Removal

With Hot-Air Flat Pack-IC Desoldering Machine:

(1) Prepare the hot-air flat pack-IC desoldering machine, then apply hot air to the Flat Pack-IC (about 5 to 6 seconds). (Fig. S-1-1)

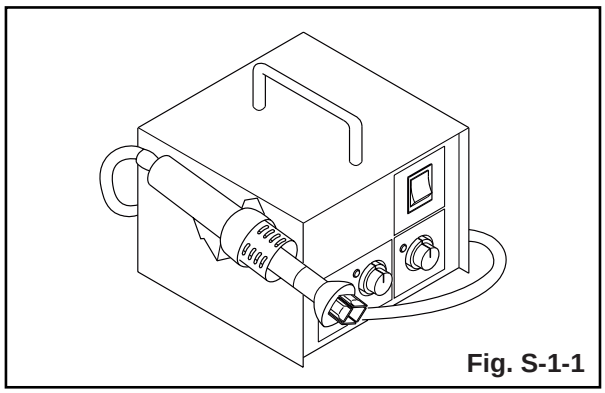


Fig. S-1-1

(2) Remove the flat pack-IC with tweezers while applying the hot air.

(3) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)

(4) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

Caution:

1. Do not supply hot air to the chip parts around the flat pack-IC for over 6 seconds because damage to the chip parts may occur. Put masking tape around the flat pack-IC to protect other parts from damage. (Fig. S-1-2)
2. The flat pack-IC on the CBA is affixed with glue, so be careful not to break or damage the foil of each pin or the solder lands under the IC when removing it.

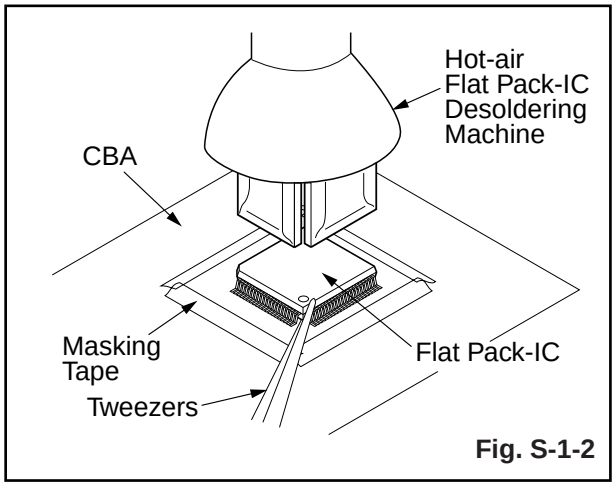


Fig. S-1-2

With Soldering Iron:

(1) Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)

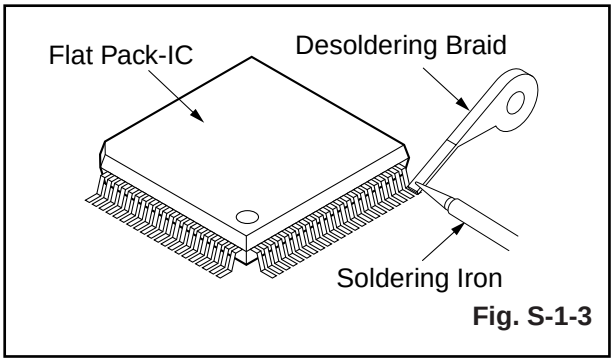


Fig. S-1-3

(2) Lift each lead of the flat pack-IC upward one by one, using a sharp pin or wire to which solder will not adhere (iron wire). When heating the pins, use a fine tip soldering iron or a hot air desoldering machine.(Fig. S-1-4)

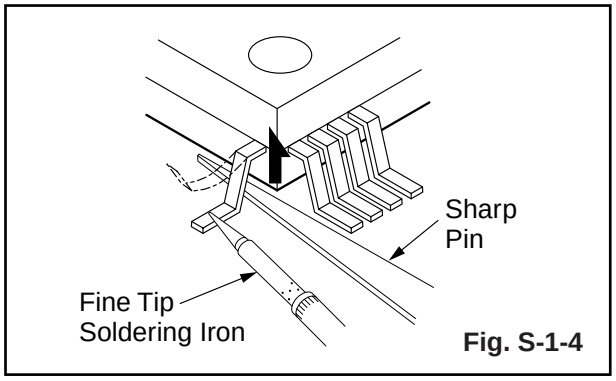


Fig. S-1-4

(3) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)

(4) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

With Iron Wire:

(1) Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)

(2) Affix the wire to a workbench or solid mounting point, as shown in Fig. S-1-5.

(3) While heating the pins using a fine tip soldering iron or hot air blower, pull up the wire as the solder melts so as to lift the IC leads from the CBA contact pads as shown in Fig. S-1-5.

(4) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)

(5) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

Note:

When using a soldering iron, care must be taken to ensure that the flat pack-IC is not being held by glue. When the flat pack-IC is removed from the CBA, handle it gently because it may be damaged if force is applied.

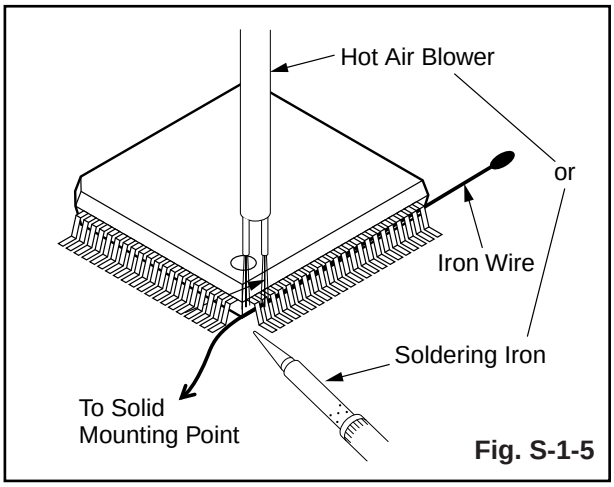


Fig. S-1-5

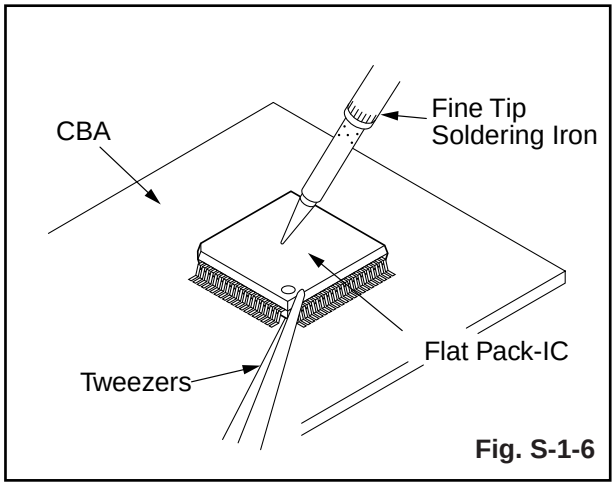


Fig. S-1-6

2. Installation

(1) Using desoldering braid, remove the solder from the foil of each pin of the flat pack-IC on the CBA so you can install a replacement flat pack-IC more easily.

(2) The "●" mark on the flat pack-IC indicates pin 1. (See Fig. S-1-7.) Be sure this mark matches the 1 on the PCB when positioning for installation. Then pre- solder the four corners of the flat pack-IC. (See Fig. S-1-8.)

(3) Solder all pins of the flat pack-IC. Be sure that none of the pins have solder bridges.

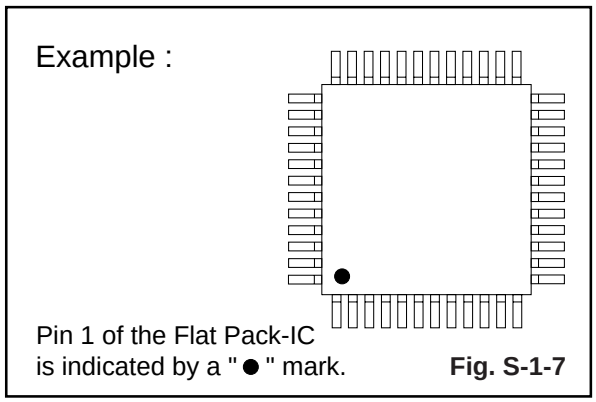


Fig. S-1-7

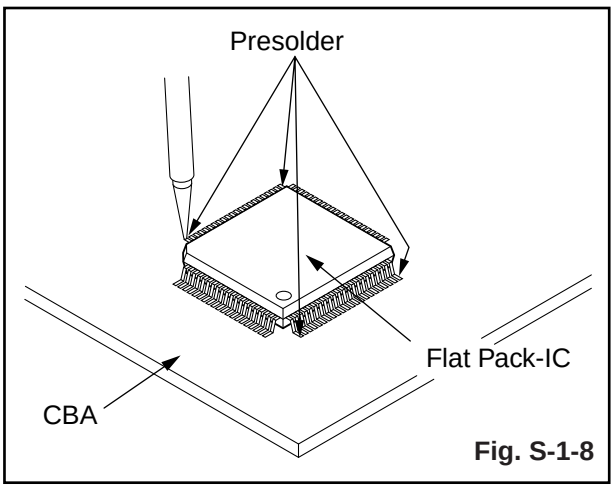


Fig. S-1-8

Instructions for Handling Semiconductors

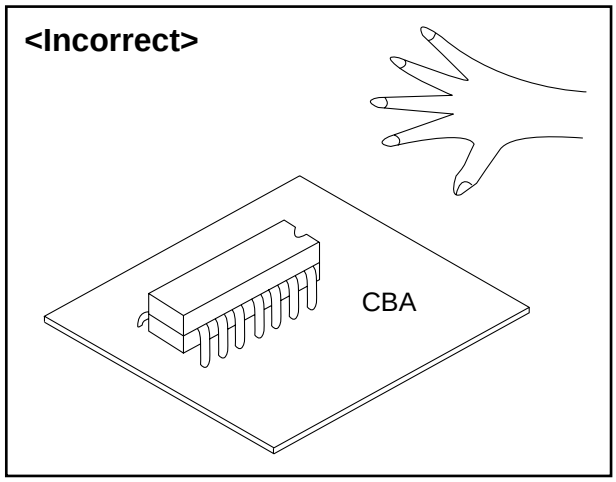
Electrostatic breakdown of the semiconductors may occur due to a potential difference caused by electrostatic charge during unpacking or repair work.

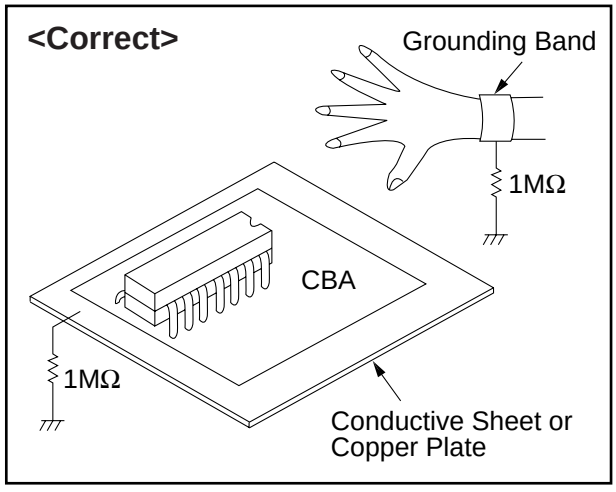
1. Ground for Human Body

Be sure to wear a grounding band (1MΩ) that is properly grounded to remove any static electricity that may be charged on the body.

2. Ground for Workbench

Be sure to place a conductive sheet or copper plate with proper grounding (1MΩ) on the workbench or other surface, where the semiconductors are to be placed. Because the static electricity charge on clothing will not escape through the body grounding band, be careful to avoid contacting semiconductors with your clothing.





CABINET DISASSEMBLY INSTRUCTIONS

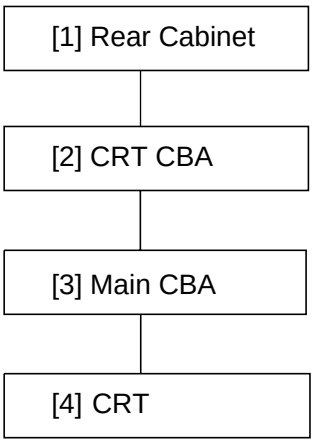
[ST413E]

1. Disassembly Flowchart

This flowchart indicates the disassembly steps for the cabinet parts, and the CBA in order to gain access to item(s) to be serviced. When reassembling, follow the steps in reverse order. Bend, route and dress the cables as they were.

Caution !

When removing the CRT, be sure to discharge the Anode Lead of the CRT with the CRT Ground Wire before removing the Anode Cap.



2. Disassembly Method

Step/ Loc. No.	Part	Removal		
		Fig. No	Remove/*unlock/ release/unplug/ unclamp/desolder	Note
[1]	Rear Cabinet	1,2	4(S-1)	1
[2]	CRT CBA	4,5	CN501	2
[3]	Main CBA	3,5	CN571	3
[4]	CRT	4	4(S-2), Anode Cap	4
↓ (1)	↓ (2)	↓ (3)	↓ (4)	↓ (5)

Note :

(1) Order of steps in procedure. When reassembling, follow the steps in reverse order. These numbers are also used as the Identification (location) No. of parts in figures.

(2) Parts to be removed or installed.

(3) Fig. No. showing procedure of part location

(4) Identification of part to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.

S=Screw, P=Spring, L=Locking Tab, CN=Connector, *=Unhook, Unlock, Release, Unplug, or Desolder
2(S-2) = two Screws (S-2)

(5) Refer to the following "Reference Notes in the Table.

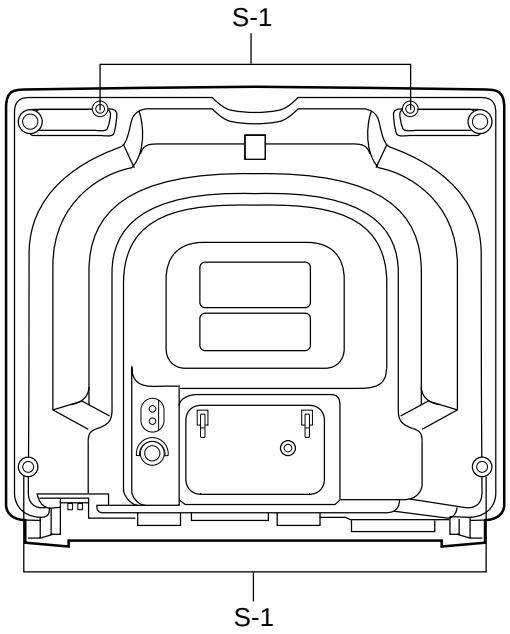
Reference Notes in the Table

1. Removal of the Rear Cabinet. Remove screws 4(S-1), then slide the Rear Cabinet backward.
2. Removal of the CRT CBA. Disconnect CN501 then pull the CRT CBA backward.
3. Removal of the Main CBA. Disconnect CN571 on the Main CBA then slide the Main CBA backward.

Caution !

Discharge the Anode Lead of the CRT with the CRT Ground Wire before removing the Anode Cap.

4. Removal of the CRT. Remove screws 4(S-2) and Anode Cap. then slide the CRT backward.



[1] Rear Cabinet

Fig. 1

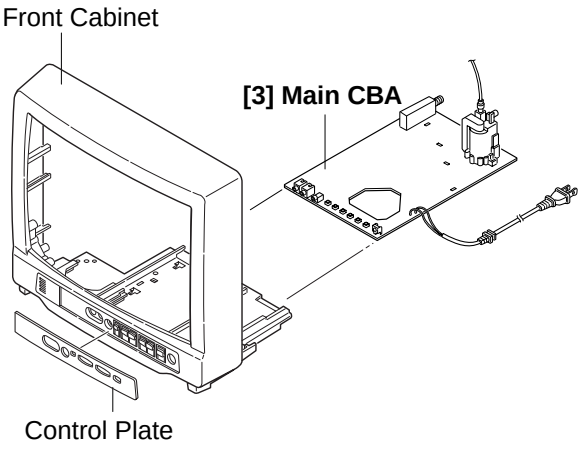


Fig. 3

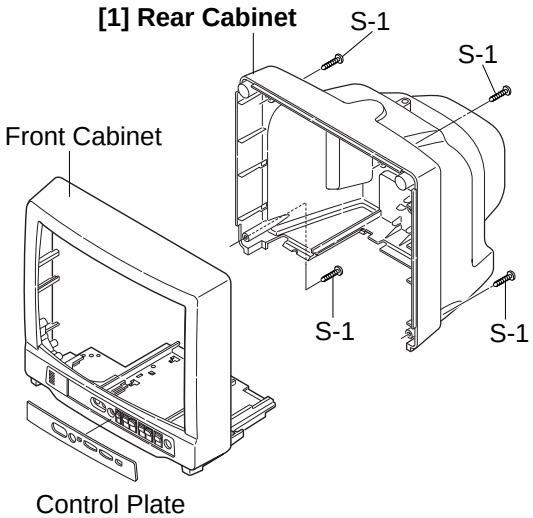


Fig. 2

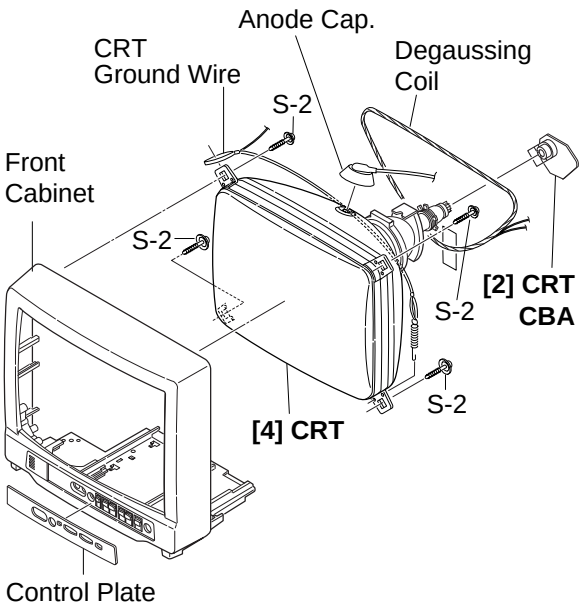


Fig. 4

TV Cable Wiring Diagram

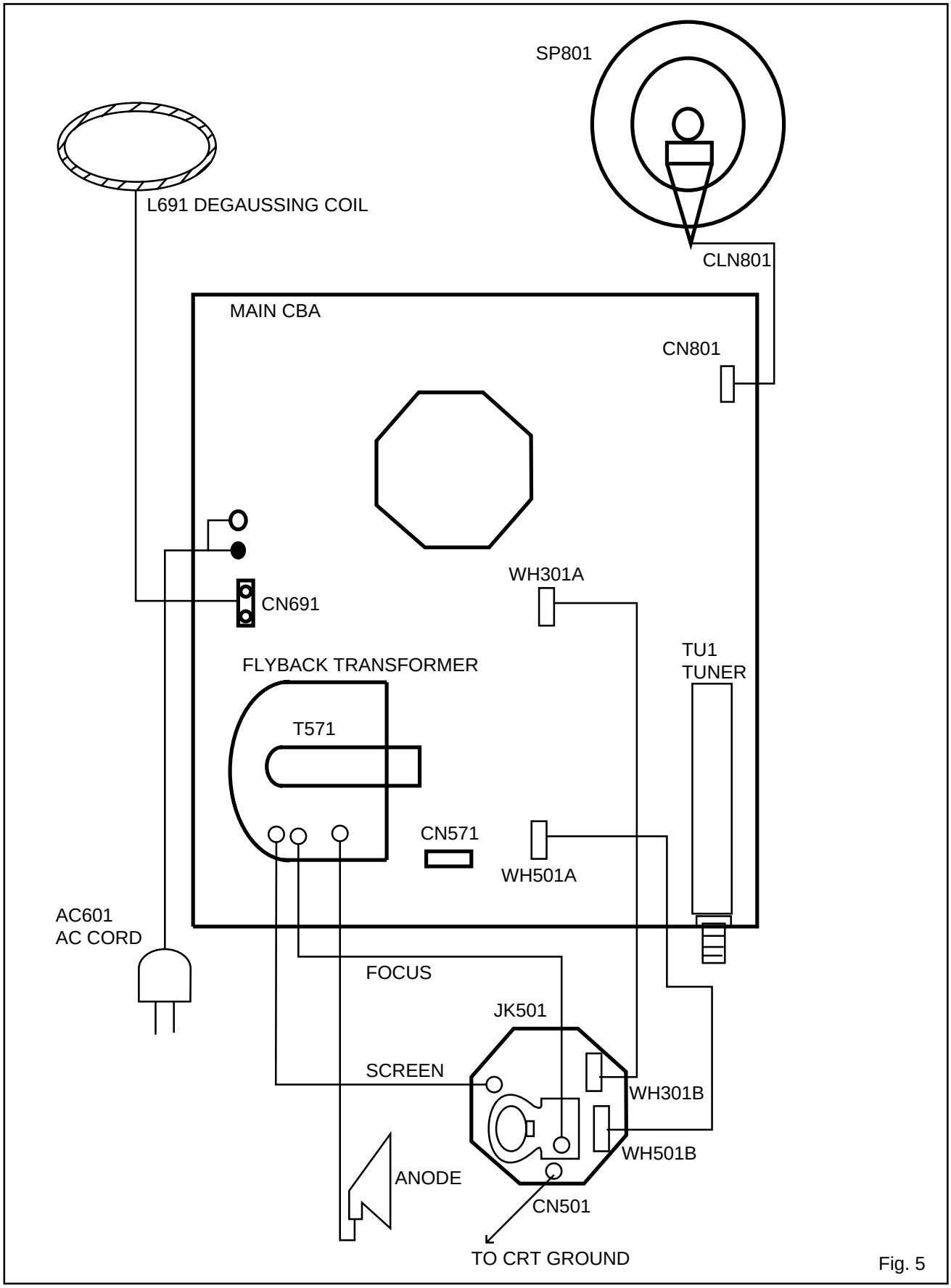


Fig. 5

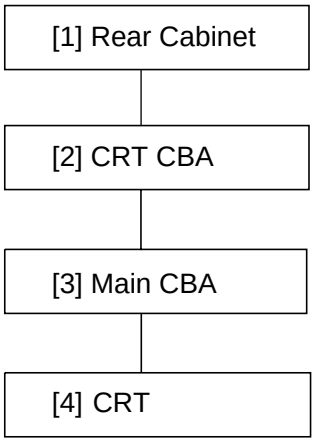
[ST419E]

1. Disassembly Flowchart

This flowchart indicates the disassembly steps for the cabinet parts, and the CBA in order to gain access to item(s) to be serviced. When reassembling, follow the steps in reverse order. Bend, route and dress the cables as they were.

Caution !

When removing the CRT, be sure to discharge the Anode Lead of the CRT with the CRT Ground Wire before removing the Anode Cap.



2. Disassembly Method

Step/ Loc. No.	Part	Removal		
		Fig. No	Remove/*unlock/ release/unplug/ unclamp/desolder	Note
[1]	Rear Cabinet	1B, 2B	5(S-1B), (S-3B)	1
[2]	CRT CBA	4B, 5B	CN501	2
[3]	Main CBA	3B, 5B	CN571	3
[4]	CRT	4B	4(S-2B), Anode Cap	4
↓ (1)	↓ (2)	↓ (3)	↓ (4)	↓ (5)

Note :

(1) Order of steps in procedure. When reassembling, follow the steps in reverse order.These numbers are also used as the Identification (location) No. of parts in figures.

(2) Parts to be removed or installed.

(3) Fig. No. showing procedure of part location

(4) Identification of part to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.

S=Screw, P=Spring, L=Locking Tab, CN=Connector, *=Unhook, Unlock, Release, Unplug, or Desolder

2(S-2) = two Screws (S-2)

(5) Refer to the following "Reference Notes in the Table."

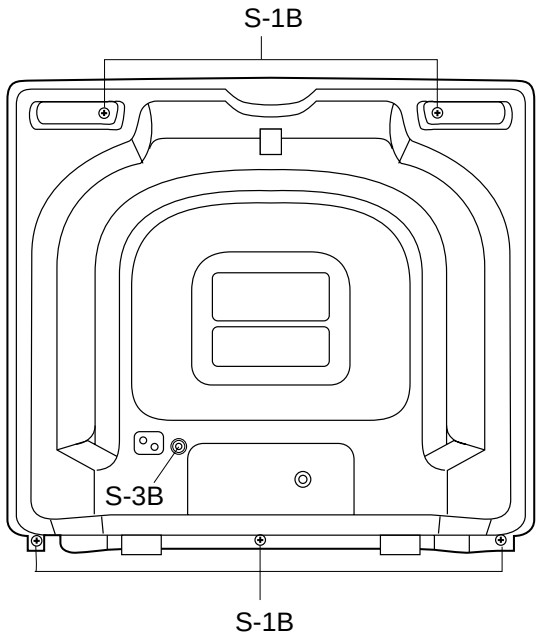
Reference Notes in the Table

1. Removal of the Rear Cabinet. Remove screws 5(S-1B) and (S-3B) then slide the Rear Cabinet backward.
2. Removal of the CRT CBA. Disconnect CN501 then pull the CRT CBA backward.
3. Removal of the Main CBA. Disconnect CN571 on the Main CBA then slide the Main CBA backward.

Caution !

Discharge the Anode Lead of the CRT with the CRT Ground Wire before removing the Anode Cap.

4. Removal of the CRT. Remove screws 4(S-2B) and Anode Cap. then slide the CRT backward.



[1] Rear Cabinet

Fig. 1B

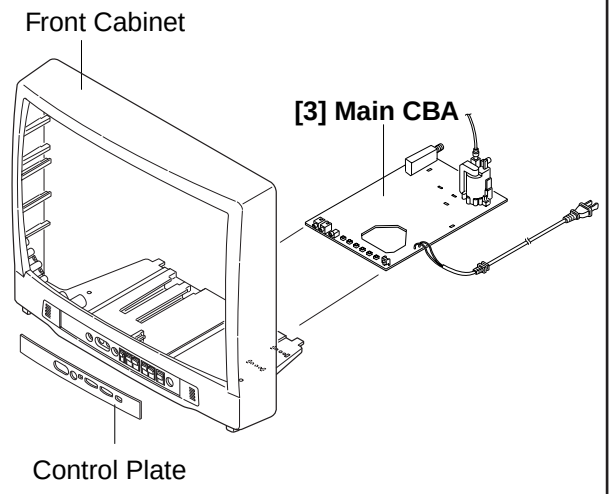


Fig. 3B

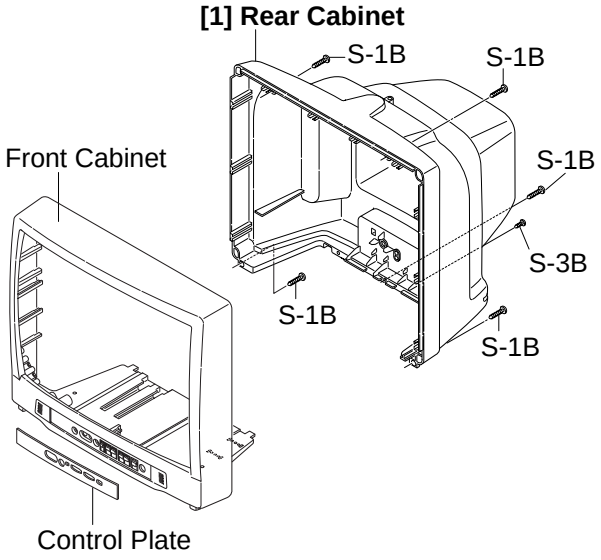


Fig. 2B

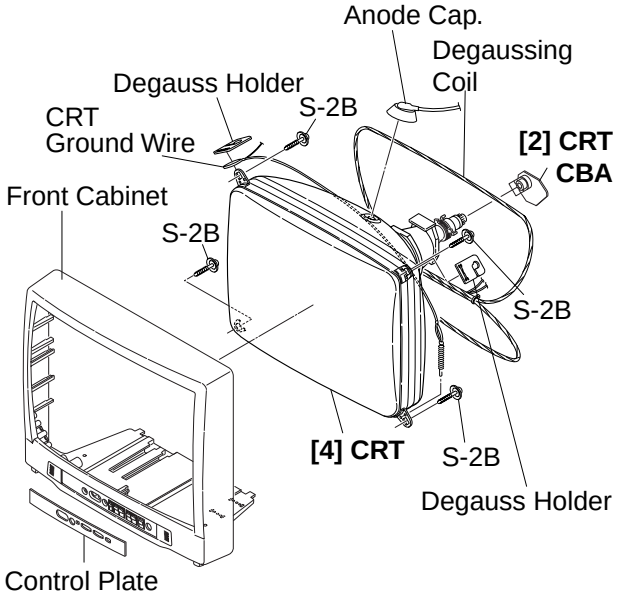


Fig. 4B

TV Cable Wiring Diagram

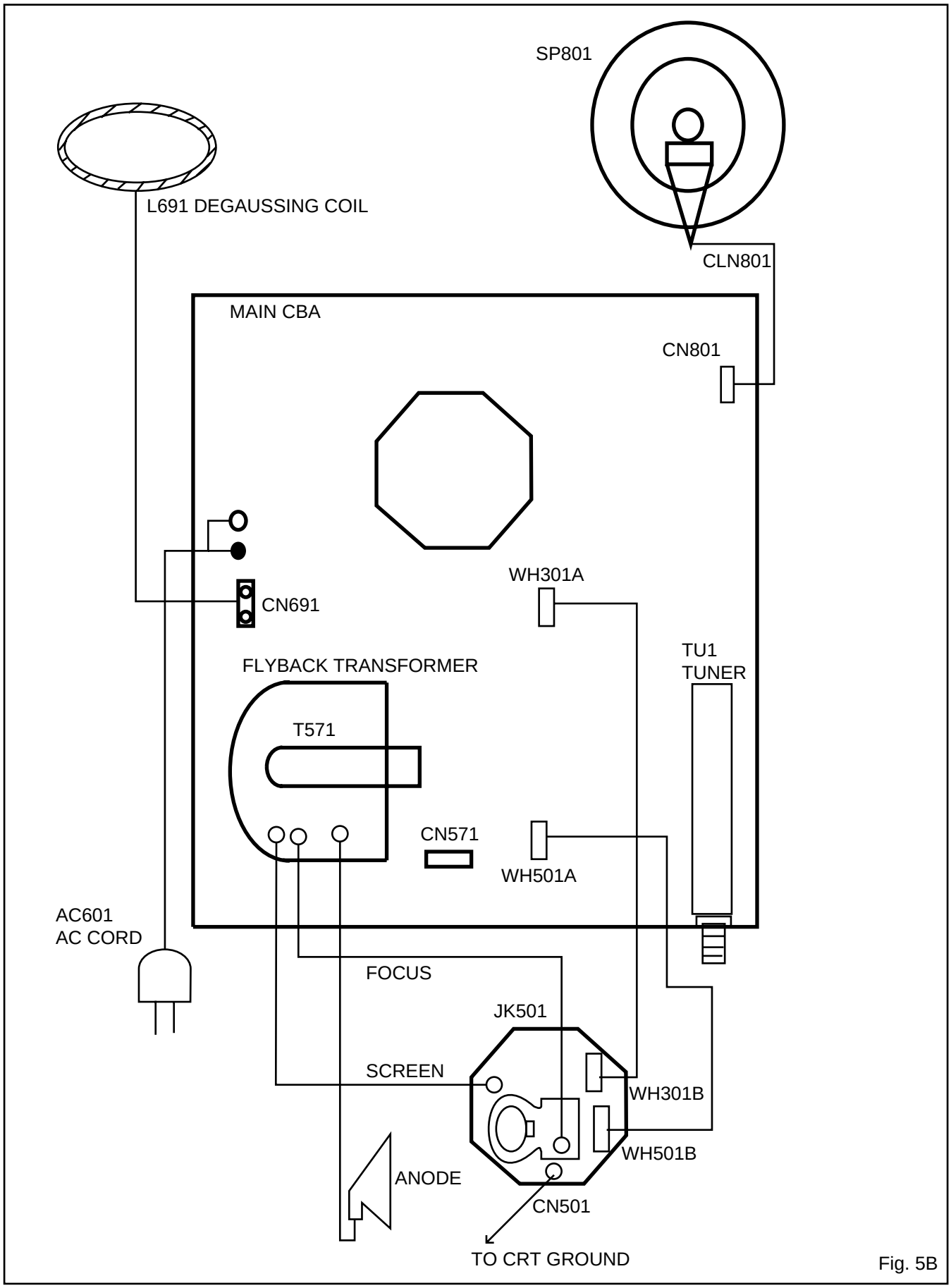


Fig. 5B

ELECTRICAL ADJUSTMENT INSTRUCTIONS

General Note:
"CBA" is abbreviation for "Circuit Board Assembly."

NOTE:

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed.
Also, do not attempt these adjustments unless the proper equipment is available.

Test Equipment Required

1. NTSC Pattern Generator (Color Bar W/White Window, Red Color, Dot Pattern, Gray Scale, Monoscope, Multi-Burst)
2. DC Voltmeter
3. Oscilloscope: Dual-trace with 10:1 probe,
   V-Range: 0.001~50V/Div,
   F-Range: DC~AC-60MHz
4. Plastic Tip Driver
5. Remote control unit: Part No. N0121UD or N0134UD
6. DC power supply 13.2V/5A
7. Color Analyzer

How to make service remote control unit:

1. Prepare normal remote control unit. (Part No. N0121UD or N0134UD) Remove 3 Screws from the back lid. (Fig. 1-1)
2. Add J1 (Jumper Wire) to the remote control CBA. (Fig. 1-2)

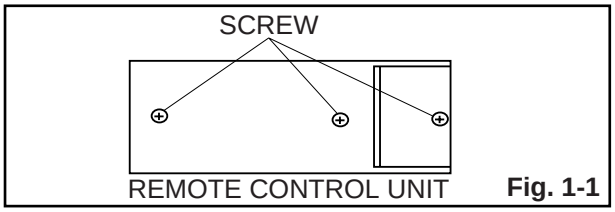


Fig. 1-1

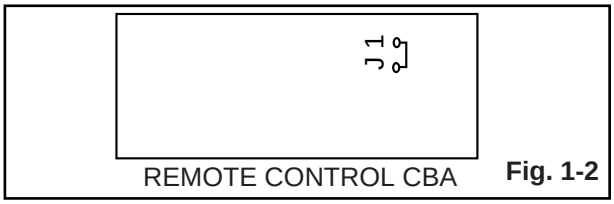


Fig. 1-2

How to set up the service mode:

Service mode:

1. Use the service remote control unit.
2. Turn the power on. (Use main power on the TV unit.)
3. Press "SLEEP" button on the service remote control unit. Version of micro computer will display on the CRT. (Ex: 058-0.06)
4. When CPU version is 058-0.06: Check the display on the lower left is "0200," set it at "0200" according to "3-1. Setting for Data Values."

1. DC 105V Adjustment [ST413E]

Purpose: To obtain correct operation.

Symptom of Misadjustment: The picture is dark and the unit does not operate correctly.

Test Point	Adj. Point
TP601 TP300 (GND)	VR661
M. EQ.	**Spec.**
DC Voltmeter, Plastic Tip Driver	+105±0.5V DC

Note:TP601, TP300 (GND), VR661 --- Main CBA

1. Connect DC Volt Meter to TP601 and TP300(GND).
2. Adjust VR661 so that the voltage of TP601 becomes +105±0.5V DC.

1. DC 114V Adjustment [ST419E]

Purpose: To obtain correct operation.

Symptom of Misadjustment: The picture is dark and the unit does not operate correctly.

Test Point	Adj. Point
TP601 TP300 (GND)	VR661
M. EQ.	**Spec.**
DC Voltmeter, Plastic Tip Driver	+114±0.5V DC

Note:TP601, TP300 (GND), VR661 --- Main CBA

1. Connect DC Volt Meter to TP601 and TP300(GND).
2. Adjust VR661 so that the voltage of TP601 becomes +114±0.5V DC.

2. Black Stretch Control Adjustment

Purpose: To show the fine black color.

Symptom of Misadjustment: Black color will not appear correctly.

Note: Use service remote control unit.

1. Enter the Service mode. (See page 5-1)
2. Press "6" button on the service remote control unit. "B-S" is indicated.
3. Press "CH ▲ / ▼" buttons on the service remote control unit so that display will change "OFF," "0," "1," "2" and "3." Then choose "B-S OFF."
4. Press "6" button on the service remote control unit. "B-S*2" is indicated.
5. Press "CH ▲ / ▼" buttons on the service remote control unit so that display will change "0" and "1." Then choose "B-S*2 0."
6. Turn the power off and on again, using the main power button on the TV unit.

3-1. Setting for Data Values

General

1. Enter the Service mode. (See page 5-1)
2. To select the data value, press "VOL ▼" button on the service remote control unit.
3. To set the following each data value, press "CH ▲ / ▼" buttons on the service remote control unit.

7F --- set to 7F

LANGUAGE --- set to SPA/FRA

ACCESS CODE --- set to OFF

SOUND TYPE --- set to MONO

VIDEO TONE --- set to OFF

FM-MODE --- set to OFF

V-OUT --- set to OFF

VIDEO --- set to V1

AV-MEMO --- set to OFF

STABLE SOUND --- set to OFF

FILTER --- set to OFF

PROTECTOR --- set to 1000

YUVMEMORY --- set to OFF

NO SIGNAL BRT --- set to 0

A-MUTE POL --- set to L

V-MENU --- set to OFF

3-2. Setting for CONTRAST, COLOR, TINT, V-TINT and SHARP data Values

General

1. Enter the Service mode. (See page 5-1)
2. Press "MENU" button on the service remote control unit. Display changes "BRIGHT," "CONTRAST," "COLOR," "TINT," "V-TINT" and "SHARP" cyclically when "MENU" button is pressed.

CONTRAST (CNT)

1. Press "MENU" button on the service remote control unit. Then select "CONTRAST" (CNT) display.
2. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "CONTRAST" (CNT) becomes 84.

COLOR (CLR)

1. Press "MENU" button on the service remote control unit. Then select "COLOR" (CLR) display.
2. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "COLOR" (CLR) becomes 58.

TINT (TNT)

1. Press "MENU" button on the service remote control unit. Then select "TINT" (TNT) display.
2. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "TINT" (TNT) becomes 57.

V-TINT (V-TNT)

1. Press "MENU" button on the service remote control unit. Then select "V-TINT" (V-TNT) display.
2. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "V-TINT" (V-TNT) becomes 60.

SHARP (SHARP)

1. Press "MENU" button on the service remote control unit. Then select "SHARP" (SHARP) display.
2. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "SHARP" (SHARP) becomes 40.

Note: BRIGHT data value does not need to be adjusted at this moment.

3-3. H Adjustment

Purpose: To get correct horizontal position and size of screen image.

Symptom of Misadjustment: Horizontal position and size of screen image may not be properly displayed.

1. Enter the Service mode. (See page 5-1)
2. Press "2" button on the service remote control unit and select H-Adj Mode.

3. Press "CH ▲ / ▼" buttons on the service remote control unit so that the display will change "0" to "7." Then choose "4."
4. Turn the power off and on again, using the main power button on the TV unit.

4. Black Level Adjustment

Purpose: Set Black Level

Symptom of Misadjustment: If Black level is incorrect, proper brightness can not be obtained by adjusting the Brightness Control.

1. Enter the Service mode. (See page 5-1.)
2. Press "MENU" button on the service remote control unit and select "BRT" mode. (Display changes "BRT," "CNT," "CLR," "TNT," "V-TINT" and "SHARP" cyclically when "MENU" button is pressed.)
3. Press "CH ▲ / ▼" buttons on the service remote control unit so that the value of "BRT" becomes 128.
4. Turn the power off and on again, using the main power button on the TV unit.

5. V. Size Adjustment

Purpose: To obtain correct vertical height of screen image.

Symptom of Misadjustment: If V.Size is incorrect, vertical height of image on the screen may not be properly displayed.

Adj. Point	Input
CH ▲ / ▼ buttons	Monoscope
M. EQ.	**Spec.**
Pattern Generator	90±5%

Note: Use service remote control unit.

1. Operate the unit for at least 20 minutes.
2. Enter the Service mode. (See page 1-5-1.)
   Press "9" button on the remote control unit and select V-S mode. (Press "9" button then display will change to V-P and V-S.)
3. Input monoscope pattern.
4. Press "CH ▲ / ▼" buttons on the service remote control unit so that the monoscope pattern is 90±5% of display size and the circle is round.
5. Turn the power off and on again, using the main power button on the TV unit.

6. V. Position Adjustment

Purpose: To obtain correct vertical position of screen image.

Symptom of misadjustment: If V. Position is incorrect, vertical height of image on the screen may not be properly displayed.

Adj. Point	Mode	Input
Screen Control, CH ▲ / ▼ buttons	RF	Monoscope
M. EQ.	**Spec.**	
Pattern Generator	90±5%	

Note: Use service remote control unit

1. Operate the unit for at least 20 minutes.
2. Enter the Service Mode. (See page 5-1)
3. Receive the Monoscope Pattern.
4. Press "9" button on the service remote control unit and select "V-P" mode. (Display change "V-S" and "V-P" cyclically when "9" button is pressed.)
5. Press "CH ▲ / ▼" buttons on the service remote control unit so that the top and bottom of the monoscope pattern are equal to each other.
6. Turn the power off and on again, using the main power button on the TV unit.

7. H. Position Adjustment

Purpose: To obtain correct horizontal position of screen image.

Symptom of Misadjustment: If H. Position is incorrect, horizontal position of image on the screen may not be properly displayed.

Adj. Point	Mode	Input
CH ▲ / ▼ buttons, [H-P] Mode	RF	Monoscope
M. EQ.	**Spec.**	
Pattern Generator	90±5%	

Note: Use service remote control unit

1. Operate the unit for at least 20 minutes.
2. Enter the Service mode. (See page 5-1)
3. Receive the Monoscope Pattern.
4. Press "8" button on the remote control unit and select "H-P" mode.
5. Press "CH ▲ / ▼" buttons on the service remote control unit so that the monoscope pattern is 90±5% of display size and the circle is round.
6. Turn the power off and on again, using the main power button on the TV unit.

8. Cut-off Adjustment

Purpose: To adjust the beam current of R, G, B, and screen voltage.

Symptom of Misadjustment: White color may be reddish, greenish or bluish.

Adj. Point	Mode	Input
Screen Control, CH ▲ / ▼ buttons	RF	Black Raster
M. EQ.	**Spec.**	
Pattern Generator	See Reference Notes below.	
Figure		

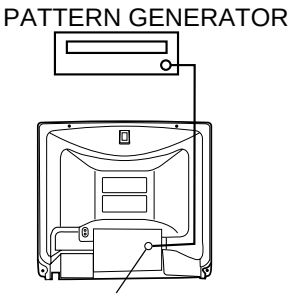


Fig 2

Note: Screen Control FBT --- Main CBA
FBT= Fly Back Transformer
Use service remote control unit

1. Degauss the CRT and allow CRT to operate for 20 minutes before starting the alignment.
2. Input the Black Raster Signal from RF Input.
3. Enter the Service mode. (See page 5-1)
4. Press "VOL ▼" button on the service remote control unit and select "C/D" mode. (Display will change "C/D," "7F," "LANGUAGE," "ACCESS CODE," "SOUND TYPE," "VIDEO TONE," "FM-MODE," "V-OUT," "VIDEO," "AV-MEMO," "STABLE," "FILTER," "YUVMEMORY" and "A-MUTE POL" cyclically when "VOL ▼" button is pressed.) Then press "1." The display will momentarily show "CUT OFF R" (R=Red.) Now there should be a horizontal line across the center of the picture tube. If needed, gradually turn the screen control on the flyback clockwise until the horizontal line appears. Adjust the Red Cut off by pressing the "CH ▲ / ▼" buttons. Proceed to Step 5 when the Red Cut off adjustment is done.
5. Press the "2" button. The display will momentarily show "CUT OFF G" (G=Green.) Adjust the Green Cut off by pressing the "CH ▲ / ▼" buttons. Proceed to step 6 when the Green Cut off adjustment is done.
6. Press the "3" button. The display will momentarily show "CUT OFF B" (B=Blue.) Adjust the Blue Cut off by pressing the "CH ▲ / ▼" buttons. When done with steps 4, 5 and 6, the horizontal line should be pure white. If not, then attempt the Cut off adjustment again.

9. White Balance Adjustment

Purpose: To mix red, green and blue beams correctly for pure white.

Symptom of Misadjustment: White becomes bluish or reddish.

Test Point	Adj. Point	Mode	Input
Screen	CH ▲ / ▼ buttons	RF	White Raster (APL 100%)
M. EQ.		**Spec.**	
Pattern Generator, Color analyzer		See below	
Figure			

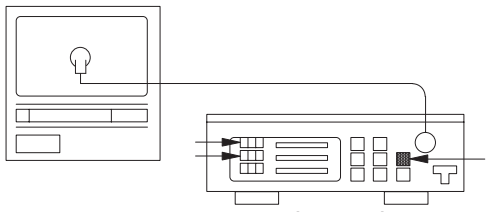


Fig. 3

Note: Use service remote control unit

1. Operate the unit more than 20 minutes.
2. Face the unit to the East. Degauss the CRT using degaussing coil.
3. Input the White Raster (APL 100%).
4. Set the color analyzer to the CHROMA mode and after zero point calibration, bring the optical receptor to the center on the tube surface (CRT).
5. Enter the Service mode. Press "VOL ▼" button on the service remote control unit and select "C/D" mode. (Display changes "C/D," "7F," "LANGUAGE," "ACCESS CODE," "SOUND TYPE," "VIDEO TONE," "FM-MODE," "V-OUT," "VIDEO," "AV-MEMO," "STABLE," "FILTER," "YUVMEMORY" and "A-MUTE POL" cyclically when "VOL ▼" button is pressed.) Then press "8" button on the Service remote control Unit.
6. Press "4" button on the service remote control unit for Red adjustment. Press "5" button on the service remote control unit for Blue adjustment.
7. In each color mode, press "CH ▲ / ▼" button to adjust the values of color.
8. Adjusting Red and Blue color so that the temperature becomes 9200K (x: 286 / y: 294) ±3%.
9. At this time, re-check that horizontal line is white. (Refer to "Cut-off Adjustment".) If not, re-adjust Cut-off Adjustment until the horizontal line becomes pure white.
10. Turn the power off and on again to return to normal mode. Receive APL 100% white signal and confirm that chroma temperatures become 9200K (x: 286 / y: 294) ±3%.

Note: Confirm that Cut Off Adj. is correct after this adjustment, and attempt Cut Off Adj. if needed.

10. Sub-Brightness Adjustment

Purpose: To get proper brightness.

Symptom of Misadjustment: If Sub-Brightness is incorrect, proper brightness cannot be obtained by adjusting the Brightness Control.

Adj. Point	Mode	Input
CH ▲ / ▼ buttons	RF	IQW
M. EQ.	**Spec.**	
Pattern Generator	See below	
Figure		

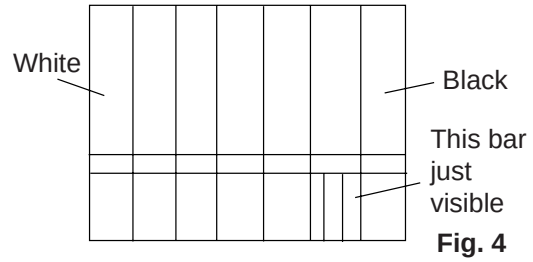


Fig. 4

Note: IQW Setup level --- 7.5 IRE
Use service remote control unit

1. Enter the Service mode. (See page 5-1)
   Then input IQW signal from RF Input.
2. Press "MENU" button on the service remote control unit and Select "BRT" mode. (Display changes "BRT," "CNT," "CLR," "TNT," "V-TINT" and "SHARP" cyclically when "MENU" button is pressed.) Press "CH ▲ / ▼" buttons so that the bar is just visible (See above figure).
3. Turn the power off and on again, using the main power button on the TV unit.

11. Focus Adjustment

Purpose: Set the optimum Focus.

Symptom of Misadjustment: If Focus Adjustment is incorrect, blurred images are shown on the display.

Adj. Point	Mode	Input
Focus Control	RF	Monoscope
M. EQ.	**Spec.**	
Pattern Generator	See below	

Note: Focus VR (FBT) --- Main CBA,
FBT= Fly Back Transformer

1. Operate the unit more than 30 minutes
2. Face the unit to the East and degauss the CRT using a degaussing coil.
3. Input the Monoscope Pattern.
4. Adjust the Focus Control on the FBT to obtain clear picture.

The following 2 adjustments normally are not attempted in the field. They should be done only when replacing the CRT then adjust as a preparation.

12. Purity Adjustment

Purpose: To obtain pure color.

Symptom of Misadjustment: If Color Purity Adjustment is incorrect, large areas of color may not be properly displayed.

Adj. Point	Input
Deflection Yoke, Purity Magnet	*Red Color
M. EQ.	**Spec.**
Pattern Generator	See below.
Figure	

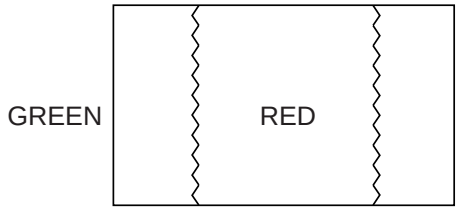


Fig. 5

1. Set the unit facing east.
2. Operate the unit for over 30 minutes before adjusting.
3. Fully degauss the unit using an external degaussing coil.
4. Loosen the screw on the Deflection Yoke Clamper and pull the Deflection Yoke back away from the screen. (See Fig. 6)
5. Loosen the Ring Lock and adjust the Purity Magnets so that a red field is obtained at the center of the screen. Tighten Ring Lock. (See Fig. 5, 6)
6. Slowly push the Deflection Yoke toward the bell of the CRT and set it where a uniform red field is obtained.
7. Tighten the clamp screw on the Deflection Yoke.

13. Convergence Adjustment

Purpose: To obtain proper convergence of red, green and blue beams.

Symptom of Misadjustment: If Convergence Adjustment is incorrect, the edge of white letters may have color edges.

Adj. Point	Input
C.P. Magnet (RB), C.P. Magnet (RB-G), Deflection Yoke	Dot Pattern or Crosshatch
M. EQ.	**Spec.**
Pattern Generator	See below.
Figure	

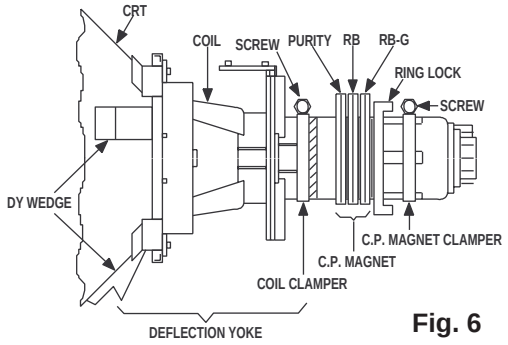


Fig. 6

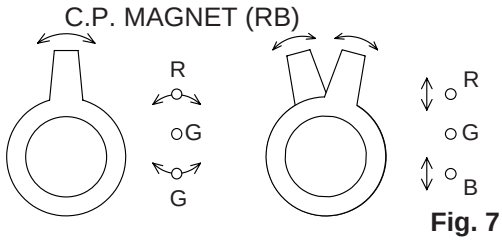


Fig. 7

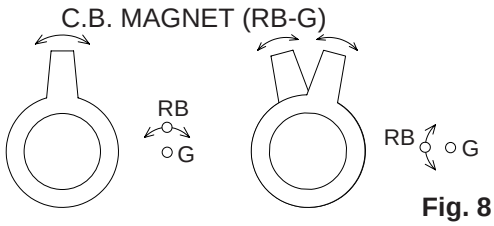
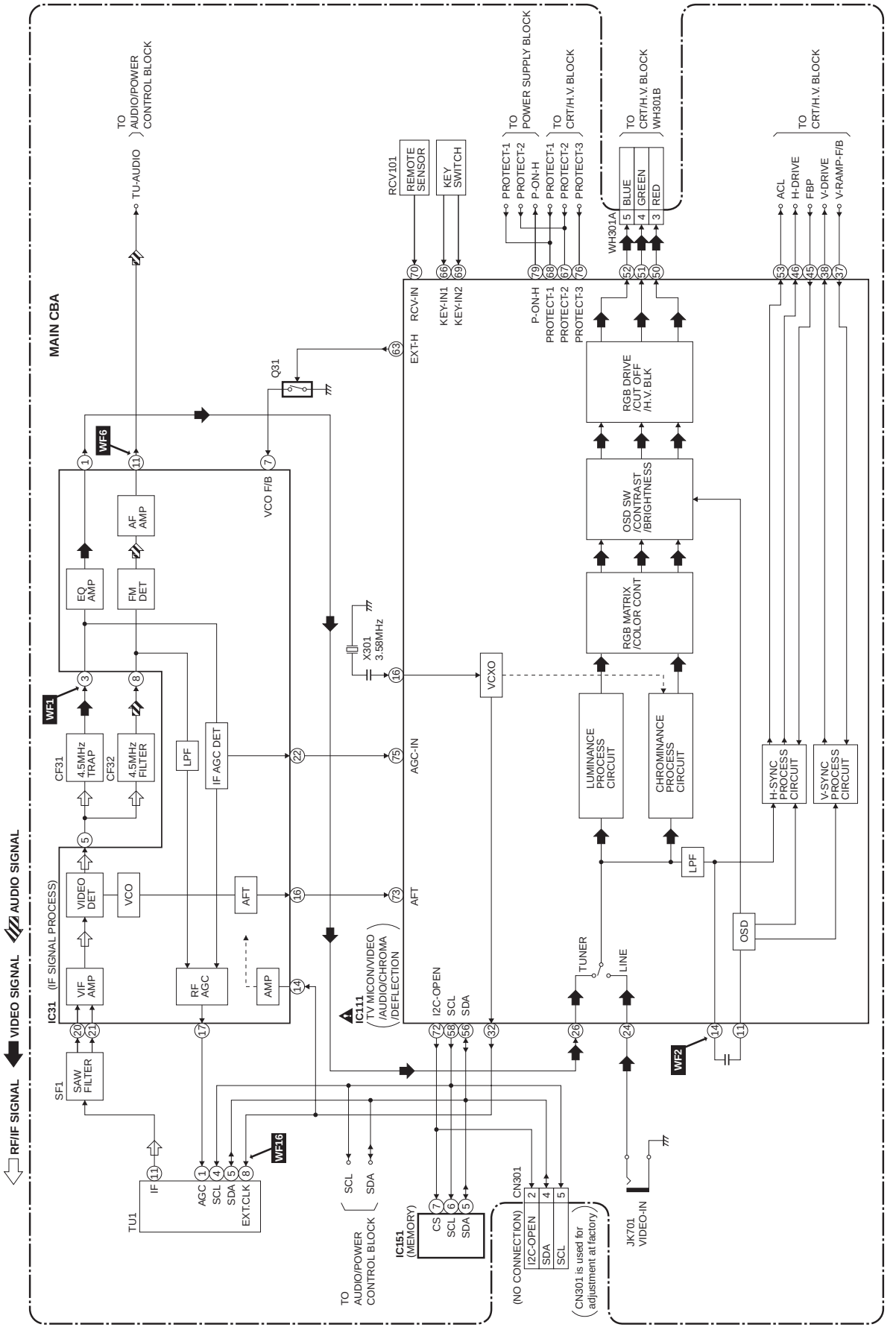


Fig. 8

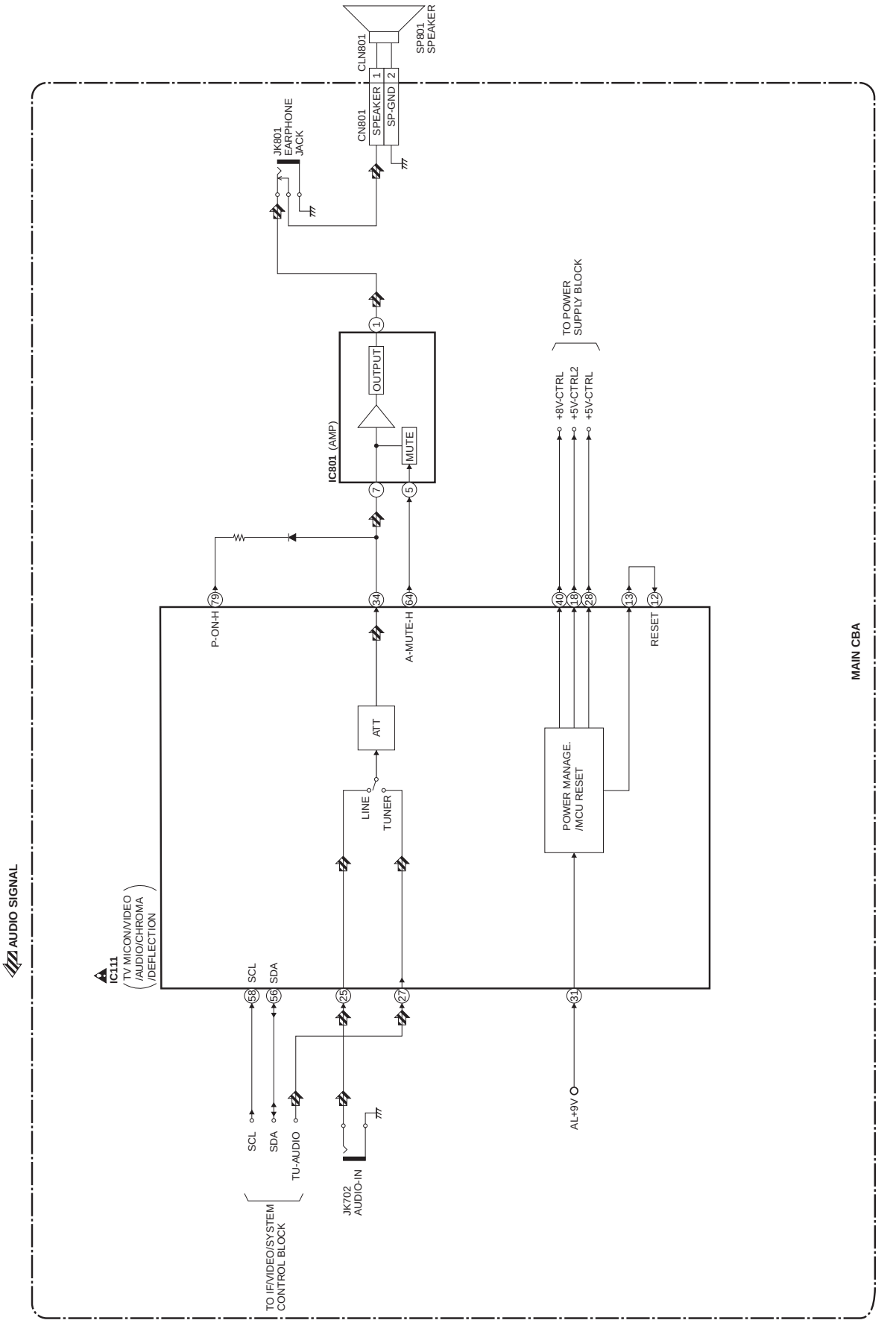
1. Loosen the Ring Lock and align red with blue dots or crosshatch at the center of the screen by rotating (RB) C.P. Magnets. (See Fig. 7)
2. Align red / blue with green dots at the center of the screen by rotating (RB-G) C.P. Magnet. (See Fig. 8)
3. Fix the C.P. Magnets by tightening the Ring Lock.
4. Remove the DY Wedges and slightly tilt the Deflection Yoke horizontally and vertically to obtain the best overall convergence.
5. Fix the Deflection Yoke by carefully inserting the DY Wedges between CRT and Deflection Yoke.

BLOCK DIAGRAMS

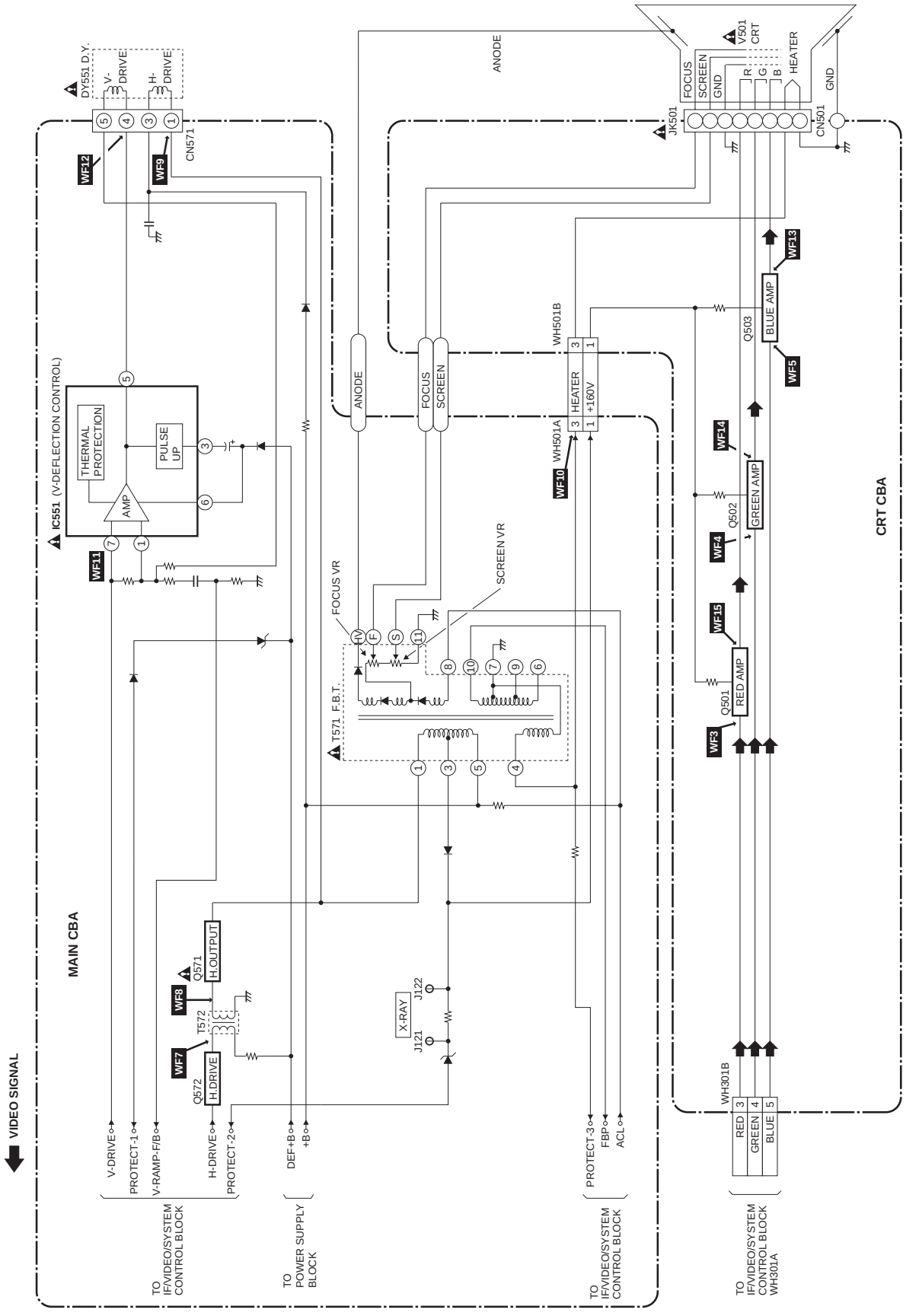
IF/Video/System Control Block Diagram



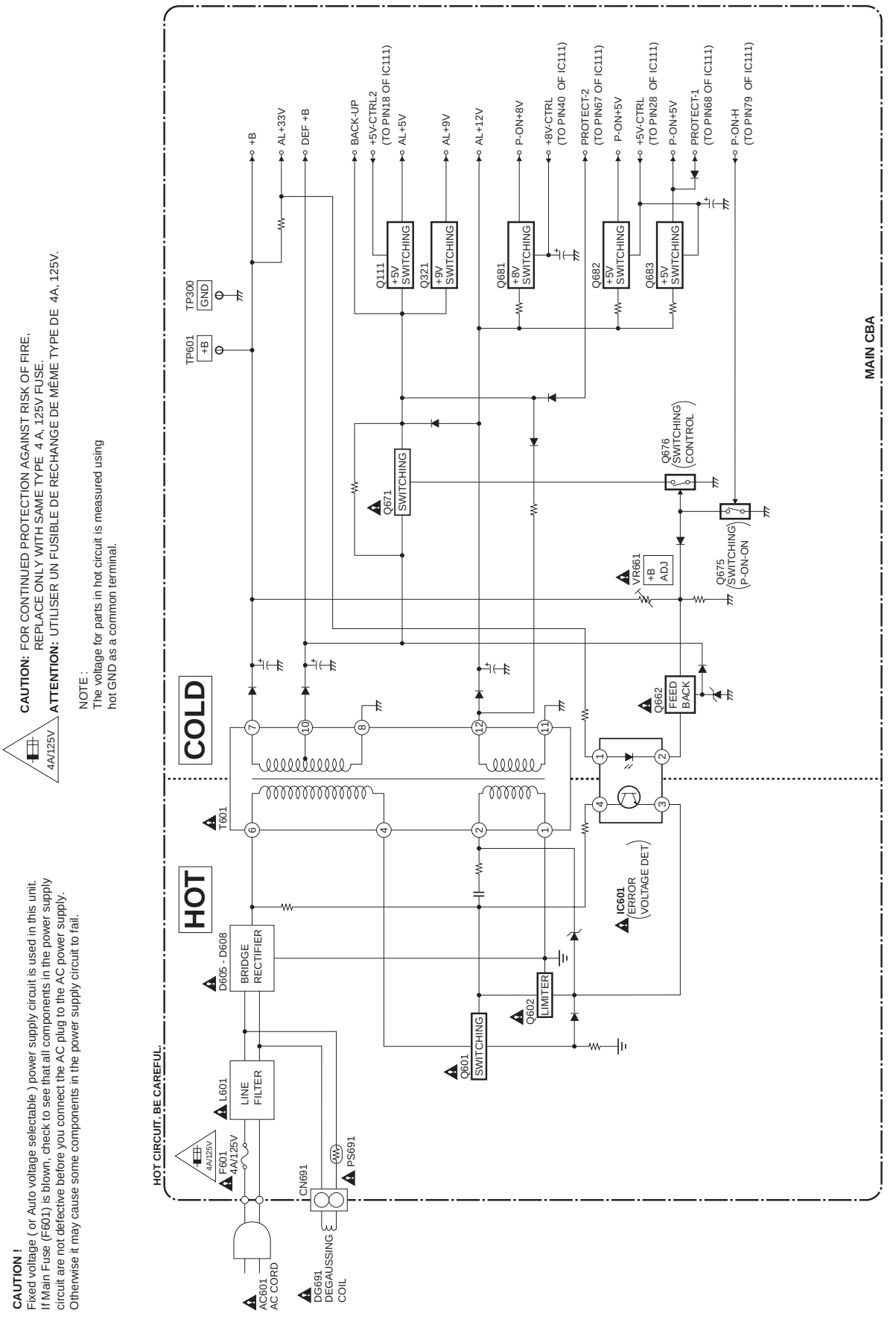
Audio/Power Control Block Diagram



CRT/H.V. Block Diagram



Power Supply Block Diagram


CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE 4 A, 125V FUSE.
ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE 4A, 125V.
4A/125V
NOTE ;
The voltage for parts in hot circuit is measured using hot GND as a common terminal.
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.
HOT CIRCUIT. BE CAREFUL.
HOT
COLD
MAIN CBA
AC601 AC CORD
DG691 DEGAUSSING COIL
CN691
PS691
F601 4A/125V
L601 LINE FILTER
D605 - D608 BRIDGE RECTIFIER
T601
Q601 SWITCHING
Q602 LIMITER
IC601 ERROR (VOLTAGE DET)
Q662 FEED BACK
VR661 +B ADJ
Q671 SWITCHING
Q675 SWITCHING P-ON-ON
Q676 SWITCHING CONTROL
Q111 +5V SWITCHING
Q321 +9V SWITCHING
Q681 +8V SWITCHING
Q682 +5V SWITCHING
Q683 +5V SWITCHING
TP601 +B
TP300 GND
+B
AL+33V
DEF +B
BACK-UP
+5V-CTRL2 (TO PIN18 OF IC111)
AL+5V
AL+9V
AL+12V
P-ON+8V
+8V-CTRL (TO PIN40 OF IC111)
PROTECT-2 (TO PIN67 OF IC111)
P-ON+5V
+5V-CTRL (TO PIN28 OF IC111)
P-ON+5V
PROTECT-1 (TO PIN68 OF IC111)
P-ON-H (TO PIN79 OF IC111)

SCHEMATIC DIAGRAMS / CBA'S AND TEST POINTS

Standard Notes

Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by the mark " ⚠ " in the schematic diagram and the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

Note:

1. Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
2. All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
3. Resistor wattages are 1/4W or 1/6W unless otherwise specified.
4. All capacitance values are indicated in µF ($P=10^{-6}$µF).
5. All voltages are DC voltages unless otherwise specified.

Note of Capacitors:

ML --- Mylar Cap. PP --- Metallized Film Cap. SC --- Semiconductor Cap. L --- Low Leakage type

Temperature Characteristics of Capacitors are noted with the following:

B --- ±10% CH --- 0±60ppm/°C CSL --- +350~-1000ppm/°C

Tolerance of Capacitors are noted with the following:

Z --- +80~-20%

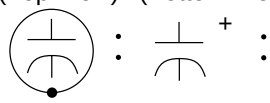
Note of Resistors:

CEM --- Cement Res. MTL --- Metal Res. F --- Fuse Res.

Capacitors and transistors are represented by the following symbols.

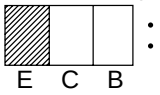
CBA Symbols

(Top View) (Bottom View)



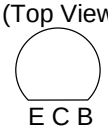
Electrolytic Capacitor

(Bottom View)



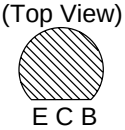
Transistor or Digital Transistor

(Top View)



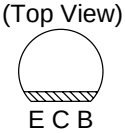
NPN Transistor

(Top View)



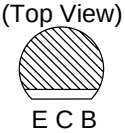
PNP Transistor

(Top View)



NPN Digital Transistor

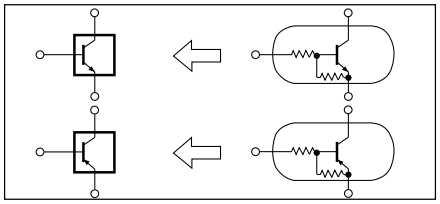
(Top View)



PNP Digital Transistor

Schematic Diagram Symbols

Digital Transistor



LIST OF CAUTION, NOTES, AND SYMBOLS USED IN THE SCHEMATIC DIAGRAMS ON THE FOLLOWING PAGES:

1. CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE_A,_V FUSE.
ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE_A,_V.

2. **CAUTION:**

Fixed Voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown, first check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

3. **Note:**

(1) Do not use the part number shown on the drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since the drawings were prepared.

(2) To maintain original function and reliability of repaired units, use only original replacement parts which are listed with their part numbers in the parts list section of the service manual.

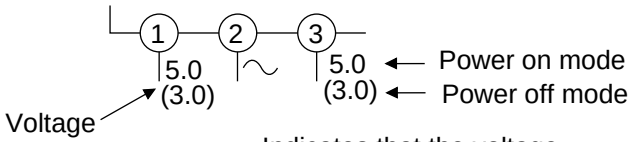
4. **Wire Connectors**

(1) Prefix symbol "CN" means "connector" (can disconnect and reconnect).

(2) Prefix symbol "CL" means "wire-solder holes of the PCB" (wire is soldered directly).

5. **Note:** Mark "●" is a leadless (chip) component.

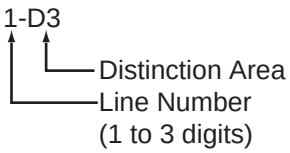
6. **Voltage indications on the schematics are as shown below:**
Plug the TV power cord into a standard AC outlet.:



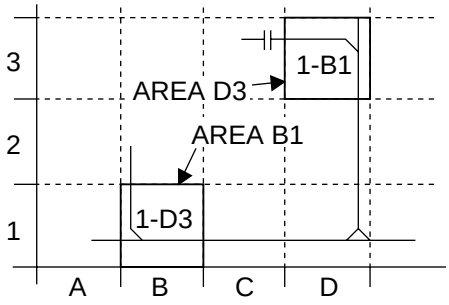
Indicates that the voltage is not consistent here.

Unit: Volts

7. **How to read converged lines**



Examples:
1. "1-D3" means that line number "1" goes to area "D3".
2. "1-B1" means that line number "1" goes to area "B1".



8. **Test Point Information**

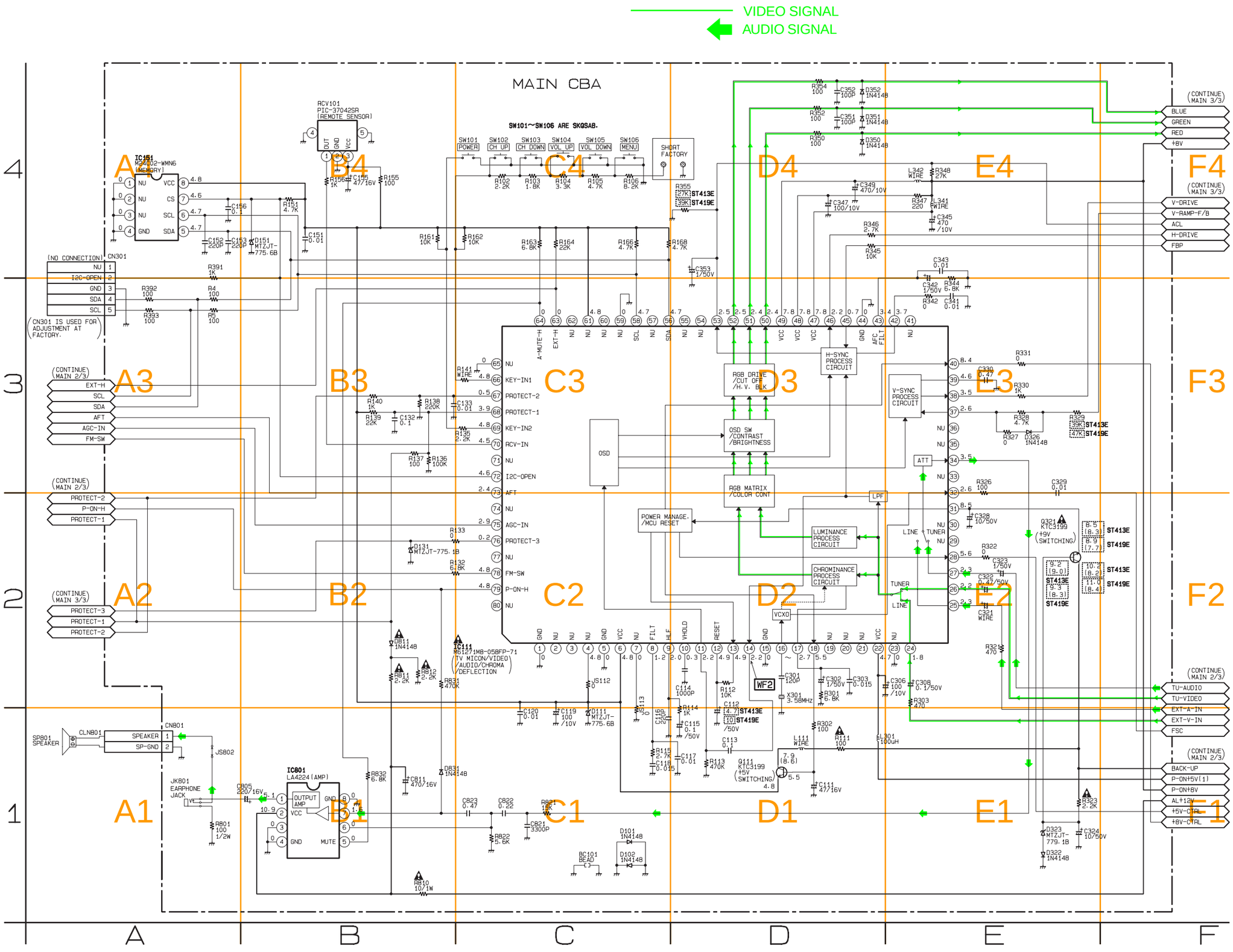
: Indicates a test point with a jumper wire across a hole in the PCB.

: Used to indicate a test point with a component lead on foil side.

: Used to indicate a test point with no test pin.

: Used to indicate a test point with a test pin.

Main 1/3 Schematic Diagram



MAIN 1/3

Ref No.	Position
ICS	
IC111	C-2
IC151	A-4
IC801	B-1
TRANSISTORS	
Q111	D-1
Q321	E-2
CONNECTORS	
CN301	A-4
CN801	A-1

Main 2/3 Schematic Diagram

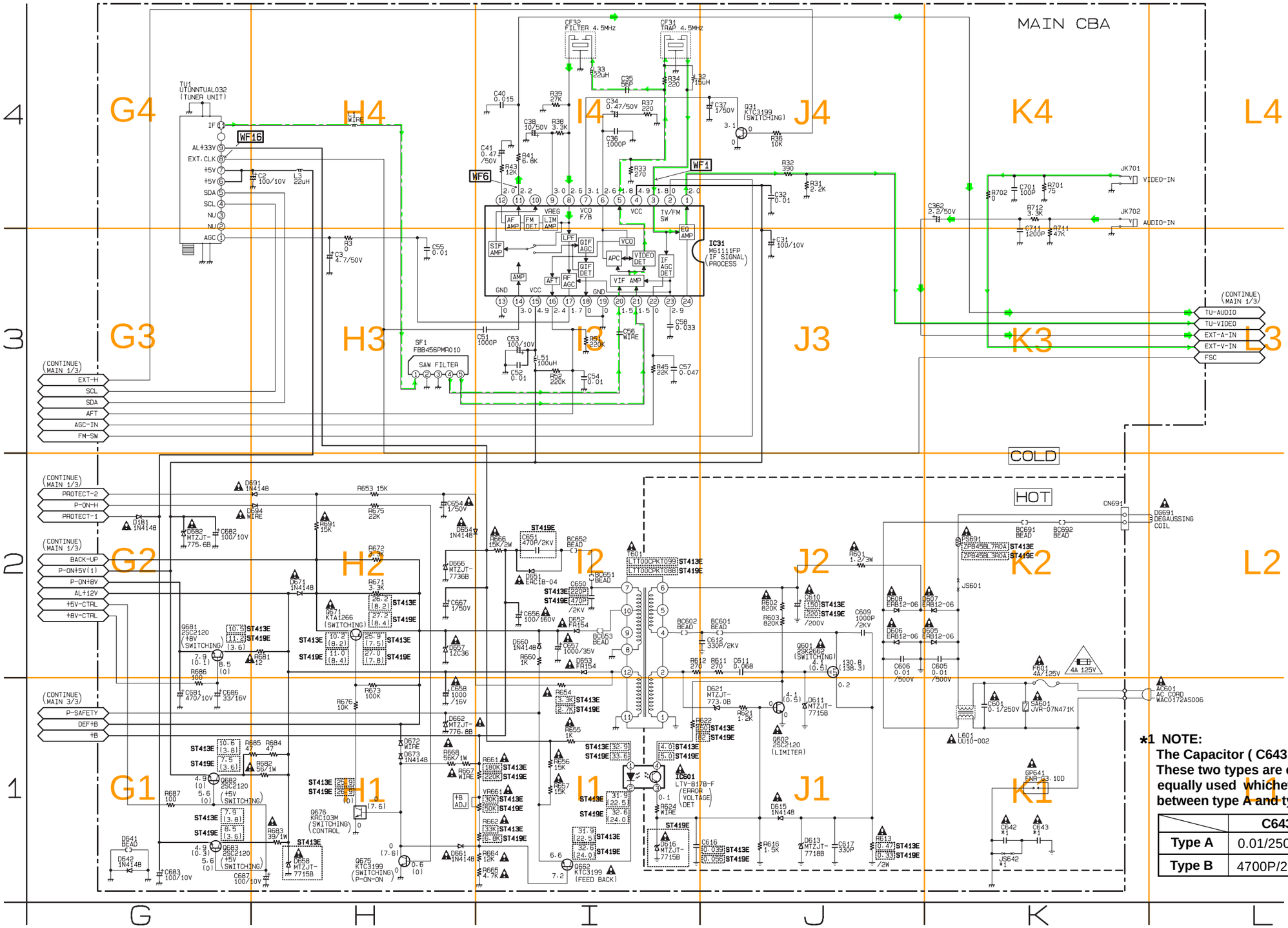
IF SIGNAL
VIDEO SIGNAL
AUDIO SIGNAL

CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE 4A, 125V FUSE.
ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE 4A, 125V.

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



MAIN 2/3

Ref No.	Position
ICS	
IC31	J-3
IC601	I-1
TRANSISTORS	
Q31	J-4
Q601	J-2
Q602	J-1
Q662	I-1
Q671	H-2
Q675	H-1
Q676	H-1
Q681	G-2
Q682	G-1
Q683	G-1
CONNECTOR	
CN691	K-2
VARIABLE RESISTOR	
VR661	I-1

***1 NOTE:**
The Capacitor (C643) is either type A or type B. These two types are exchangeable and can be equally used whichever the model is . The difference between type A and type B is shown in the table below.

	C643	C642	JS642
Type A	0.01/250V	0.01/250V	Not Used
Type B	4700P/250V	Not Used	WIRE

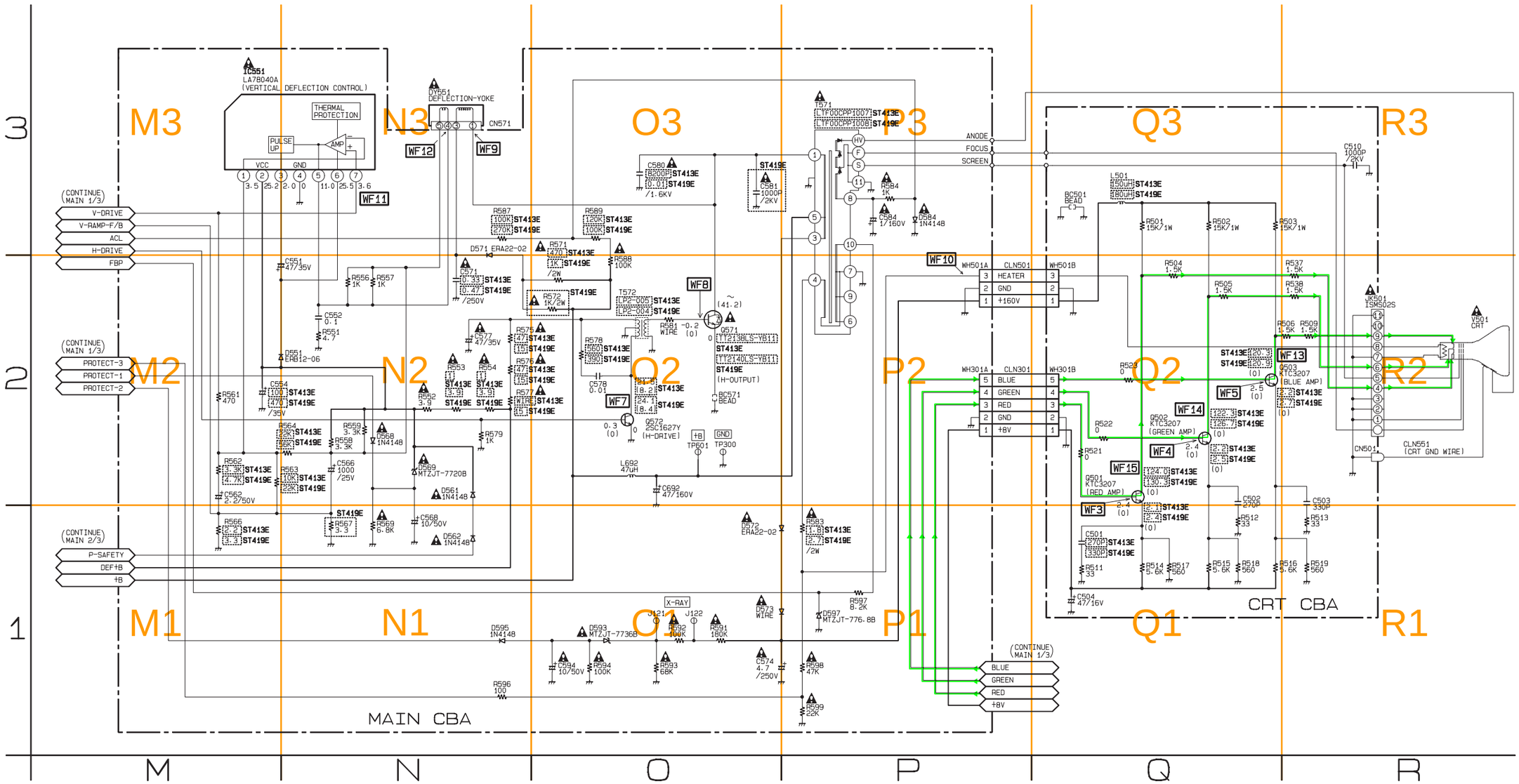
Main 3/3 & CRT Schematic Diagram

MAIN 3/3

Ref No.	Position
IC	
IC551	M-3
TRANSISTORS	
Q571	O-2
Q572	O-2
CONNECTORS	
CN571	N-3
WH301A	P-2
WH501A	P-2
TEST POINTS	
TP300	O-2
TP601	O-2

CRT

Ref No.	Position
TRANSISTORS	
Q501	Q-2
Q502	Q-2
Q503	R-2
CONNECTORS	
CN501	R-2
WH301B	Q-2
WH501B	Q-2



Main CBA Top View

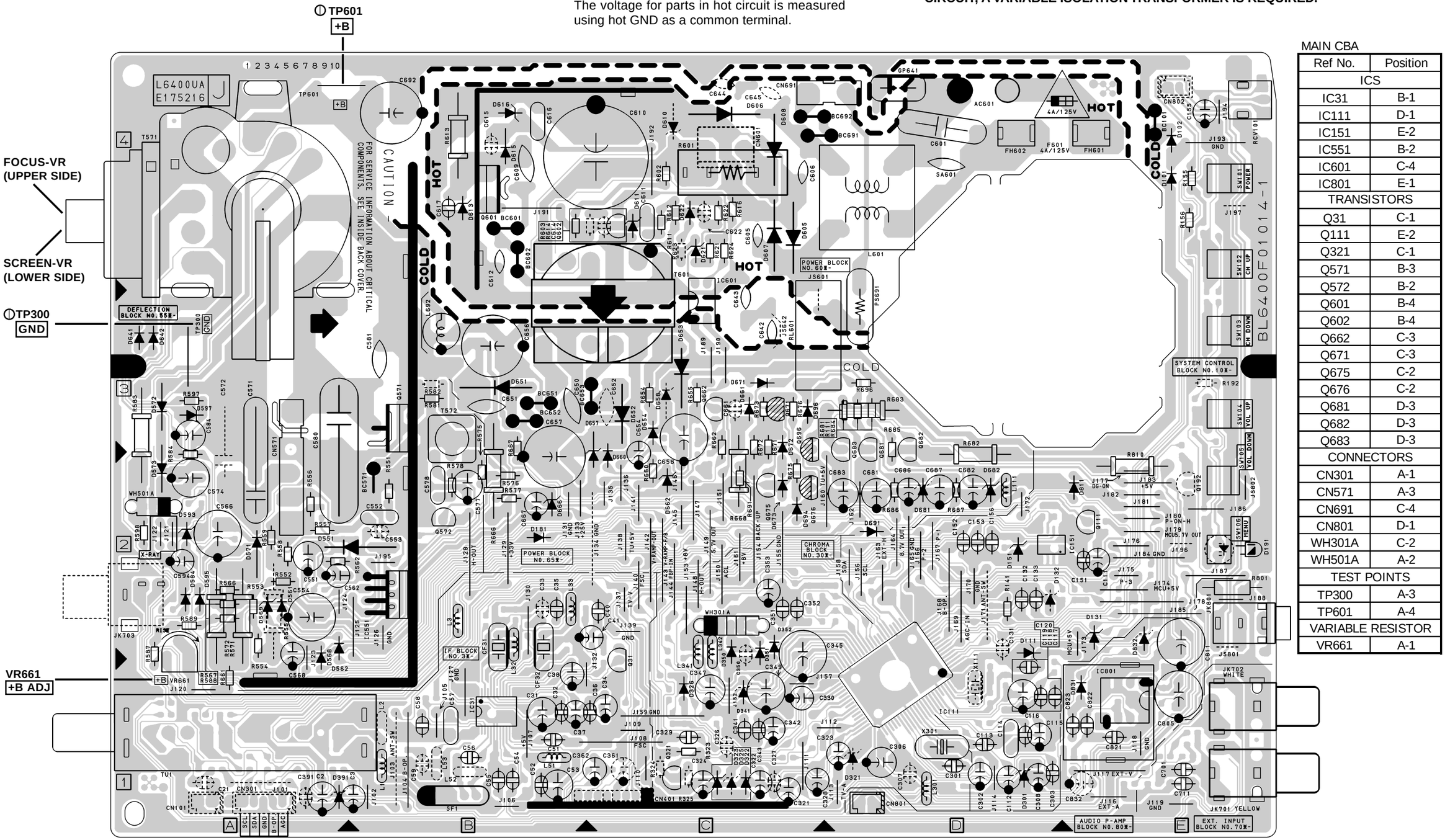
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE 4A, 125V FUSE.
ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE 4A, 125V.

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

BECAUSE A HOT CHASSIS GROUND IS PRESENT IN THE POWER SUPPLY CIRCUIT, AN ISOLATION TRANSFORMER MUST BE USED. ALSO, IN ORDER TO HAVE THE ABILITY TO INCREASE THE INPUT SLOWLY, WHEN TROUBLESHOOTING THIS TYPE POWER SUPPLY CIRCUIT, A VARIABLE ISOLATION TRANSFORMER IS REQUIRED.



MAIN CBA

Ref No.	Position
ICS	
IC31	B-1
IC111	D-1
IC151	E-2
IC551	B-2
IC601	C-4
IC801	E-1
TRANSISTORS	
Q31	C-1
Q111	E-2
Q321	C-1
Q571	B-3
Q572	B-2
Q601	B-4
Q602	B-4
Q662	C-3
Q671	C-3
Q675	C-2
Q676	C-2
Q681	D-3
Q682	D-3
Q683	D-3
CONNECTORS	
CN301	A-1
CN571	A-3
CN691	C-4
CN801	D-1
WH301A	C-2
WH501A	A-2
TEST POINTS	
TP300	A-3
TP601	A-4
VARIABLE RESISTOR	
VR661	A-1

Main CBA Bottom View

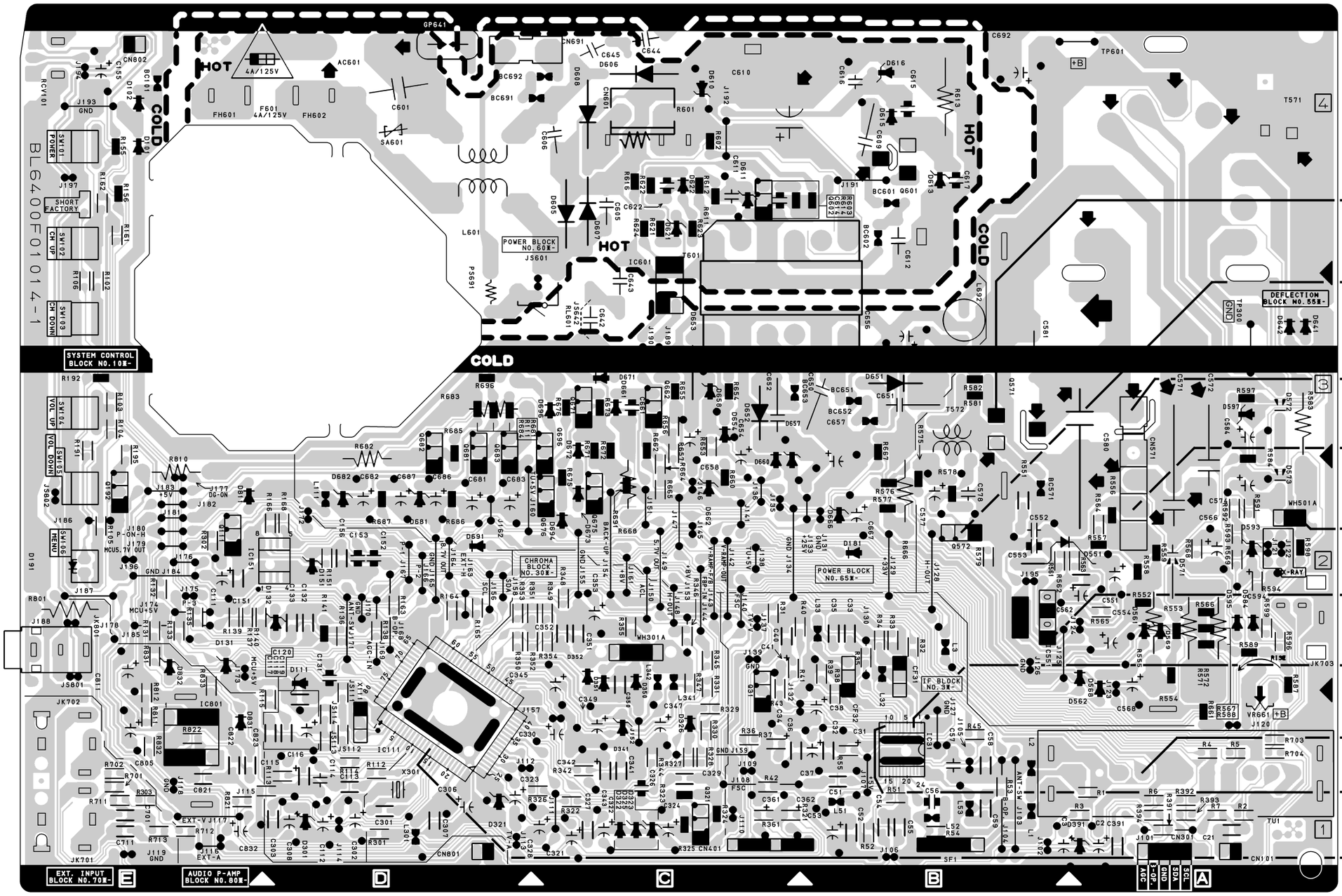
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE 4A, 125V FUSE.
ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE 4A, 125V.

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

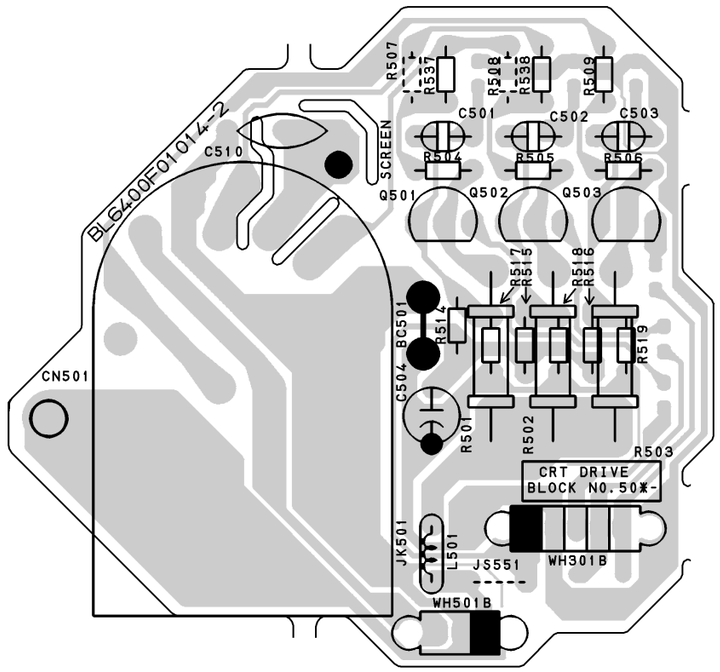
BECAUSE A HOT CHASSIS GROUND IS PRESENT IN THE POWER SUPPLY CIRCUIT, AN ISOLATION TRANSFORMER MUST BE USED. ALSO, IN ORDER TO HAVE THE ABILITY TO INCREASE THE INPUT SLOWLY, WHEN TROUBLESHOOTING THIS TYPE POWER SUPPLY CIRCUIT, A VARIABLE ISOLATION TRANSFORMER IS REQUIRED.



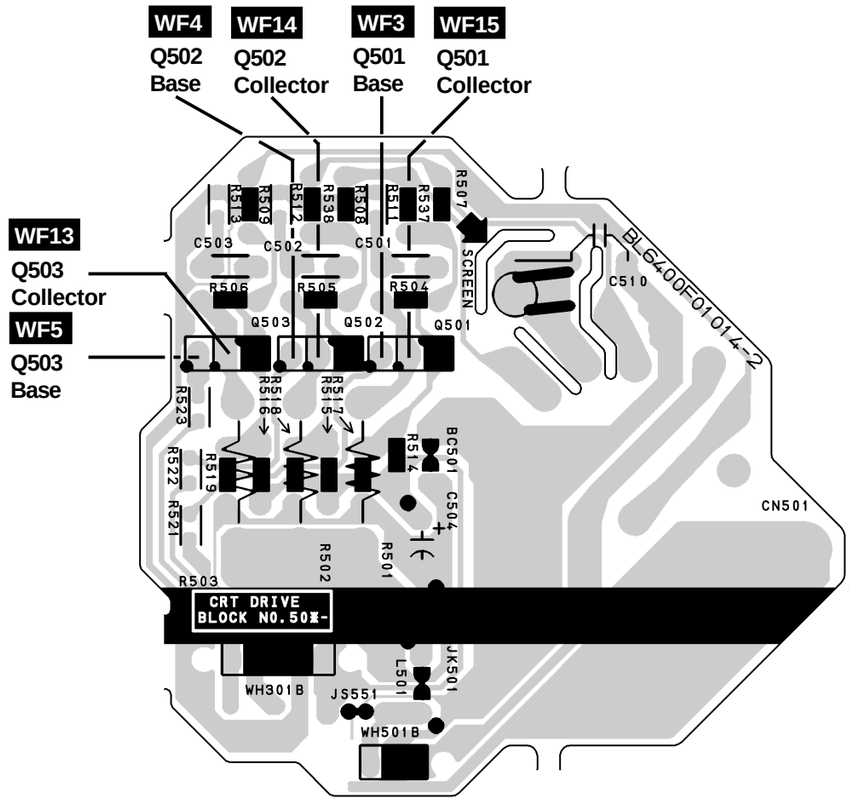
CRT CBA Top View

CRT CBA

Ref No.	Position
TRANSISTORS	
Q501	B-2
Q502	B-2
Q503	B-2
CONNECTORS	
CN501	A-1
WH301B	B-1
WH501B	B-1



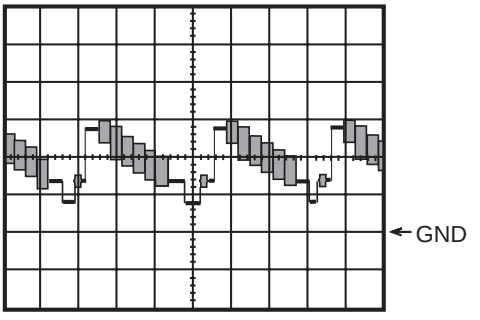
CRT CBA Bottom View



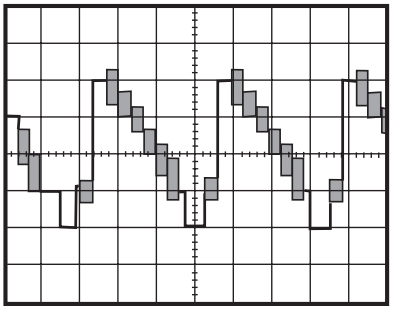
WAVEFORMS

WF1 ~ WF16 = Waveforms to be observed at
Waveform check points.
(Shown in Schematic Diagram.)

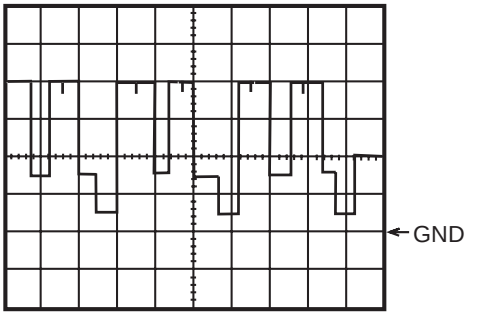
Input: NTSC Color Bar Signal (with 1kHz Audio Signal)
INITIAL POSITION: Unplug unit from AC outlet for at least 5 minutes.
reconnect to AC outlet and then turn power on.
(Brightness---Center Color---Center Tint --- Center Contrast---Approx 70%)



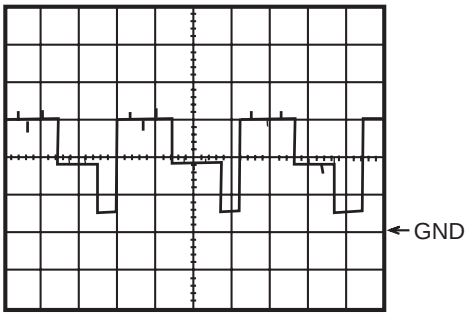
WF1 1DIV: 0.5V 20µsec
IC 31 Pin 3



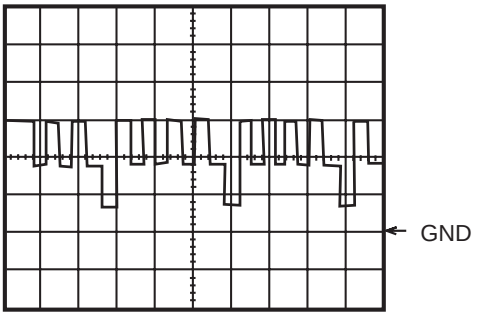
WF2 1DIV: 0.5V 20µsec
IC 111 Pin 14



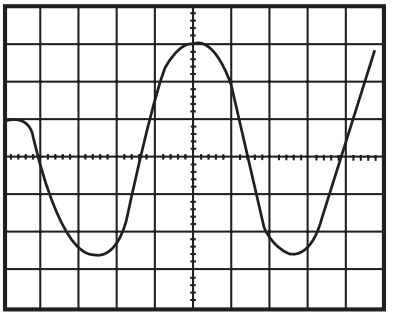
WF3 1DIV: 2V 20µsec
Q501 Base



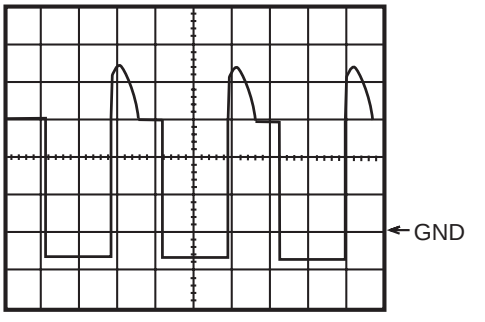
WF4 1DIV: 2V 20µsec
Q 502 Base



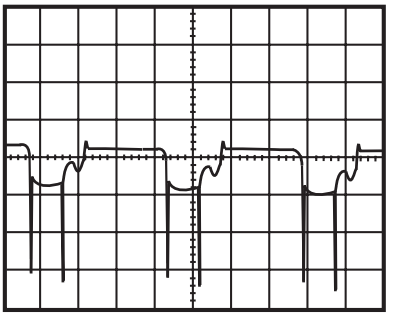
WF5 1DIV: 2V 20µsec
Q 503 Base



WF6 1DIV: 0.2V 20msec
IC 31 Pin 11



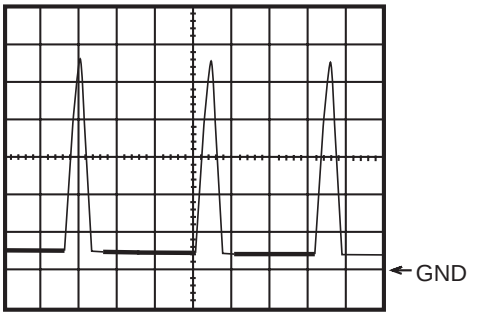
WF7 1DIV: 10V 20µsec
Q 572 Collector



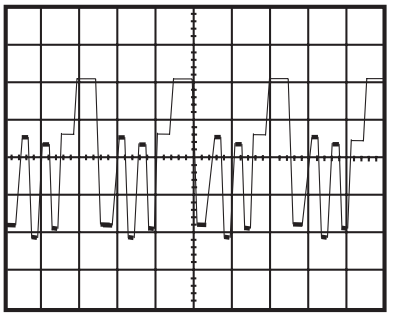
WF8 1DIV: 5V 20µsec
Q 571 Base

WF1 ~ WF16 = Waveforms to be observed at
Waveform check points.
(Shown in Schematic Diagram.)

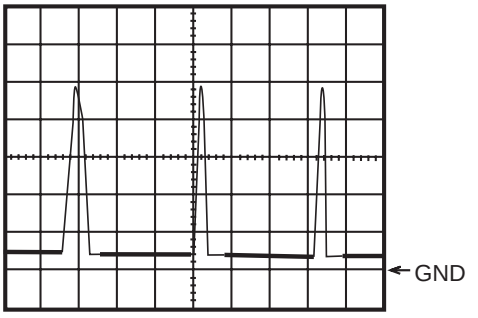
Input: NTSC Color Bar Signal (with 1kHz Audio Signal)
INITIAL POSITION: Unplug unit from AC outlet for at least 5 minutes.
reconnect to AC outlet and then turn power on.
(Brightness---Center Color---Center Tint --- Center Contrast---Approx 70%)



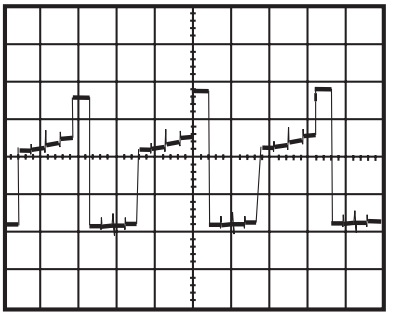
WF9 1DIV: 200V 20µsec
CN 571 Pin 1



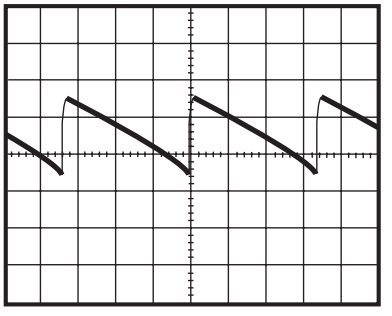
WF13 1DIV: 20V 20µsec
Q503 Collector



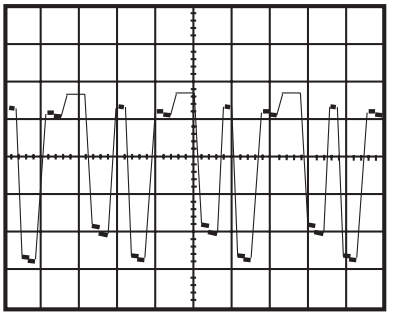
WF10 1DIV: 5V 20µsec
WH501A Pin 3



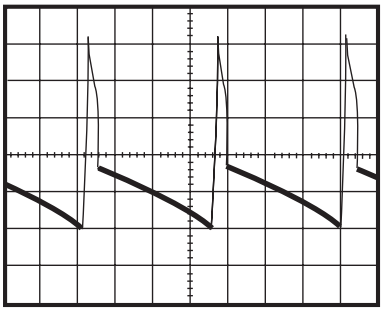
WF14 1DIV: 20V 20µsec
Q 502 Collector



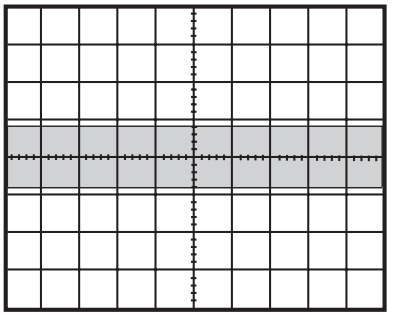
WF11 1DIV: 1V 5msec
IC 551 Pin 7



WF15 1DIV: 20V 20µsec
Q 501 Collector

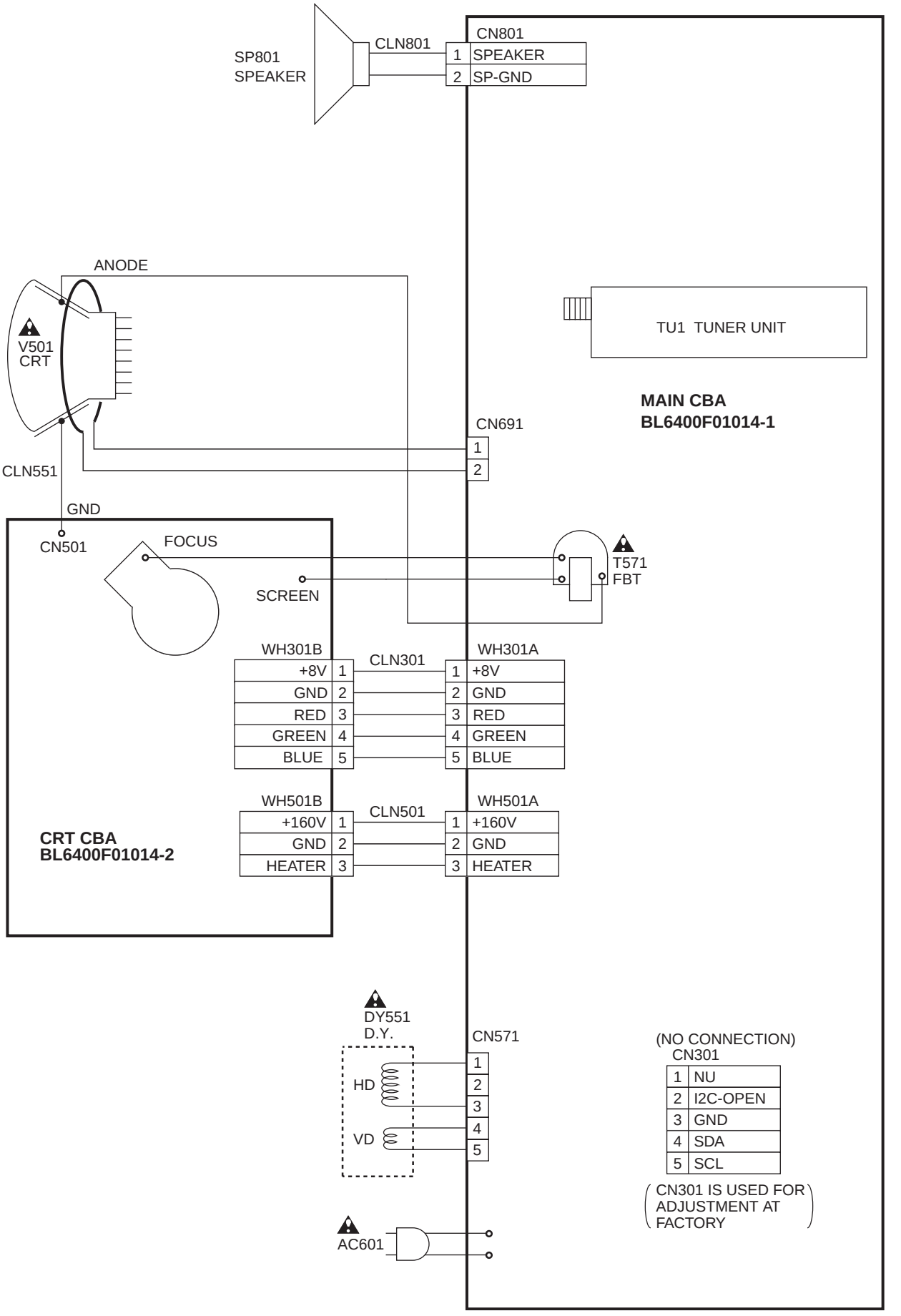


WF12 1DIV: 10V 5msec
CN 571 Pin 4



WF16 1DIV: 0.2V 20µsec
TU 1 Pin 8

WIRING DIAGRAM



IC PIN FUNCTIONS

IC111 (TV Micro Controller)

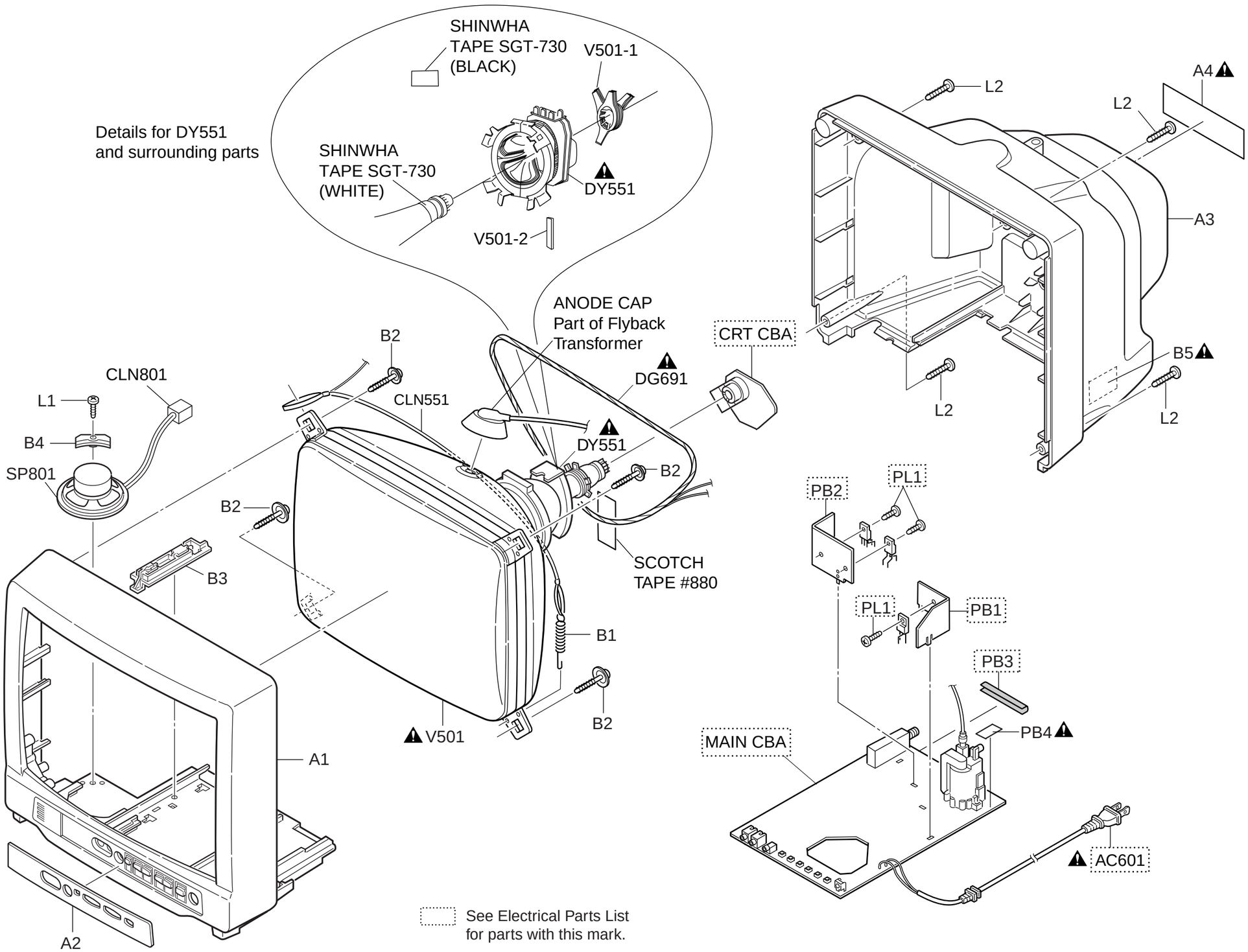
Pin No.	Signal Name	Function
1	GND	GND
2	N.U.	Not Used
3	N.U.	Not Used
4	N.U.	Not Used
5	GND	GND
6	VCC	AL+5V
7	N.U.	Not Used
8	FILT	FILT
9	HLF	Filter for CCD
10	VHOLD	VHOLD
11	CVIN	Input for Video Signal
12	RESET	RESET
13	MCU RESET OUT	RESET Signal Output
14	Y-SW OUT	Composite Signal Output
15	GND	GND
16	3.58 X'TAL	3.58MHz Crystal
17	C-APC	CHROMINANCE APC
18	MCU 5.7REG OUT	Micro controller Control Voltage Output
19	N.U.	Not Used
20	N.U.	Not Used
21	N.U.	Not Used
22	VCC	VCC
23	N.U.	(GND)
24	CVBS IN2	Composite Signal Input 2
25	AUDIO IN2	Audio Signal Input 2
26	CVBS IN1	Composite Signal Input 1
27	AUDIO IN1	Audio Signal Input 1
28	5.7V REG OUT	5.7V Output
29	N.U.	Not Used
30	N.U.	Not Used
31	V REG VCC	DC 8.7V Input
32	FSC OUT	Clock Output 3.58MHz
33	N.U.	Not Used
34	AUDIO ATT OUT	Audio Signal Output
35	N.U.	Not Used
36	N.U.	Not Used
37	V RAMP F/B	V Ramp Feed Back
38	V RAMP OUT	Vertical Output
39	V RAMP CAP	V Ramp OSC Capacitor
40	8.7 VREG OUT	DC 8.7V Output
41	N.U.	Not Used
42	H VCO F/B	H Vco Feed Back
43	AFC FILT	Horizontal AFC Filter
44	GND	GND
45	FBP IN	Flyback Pulse Input
46	H-OUT	H Pulse Output
47	VCC	Vcc
48	VCC	Vcc
49	VCC	Vcc
50	R OUT	Red Output
51	G OUT	Green Output
52	B OUT	Blue Output
53	ACL	IB-Input
54	N.U.	Not Used
55	N.U.	Not Used
56	SDA	I2C-BUS Controller Interface (Data)
57	N.U.	Not Used
58	SCL	I2C-BUS Controller Interface (Clock)
59	N.U.	(GND)
60	N.U.	Not Used
61	N.U.	(+5V)
62	N.U.	Not Used
63	EXT-H	EXT-H
64	A-MUTE-H	Audio Mute
65	N.U.	Not Used
66	KEY-IN 1	Key Input 1 (Main)
67	PROTECT 2	Power Supply Protection
68	PROTECT 1	Power Supply Protection
69	KEY-IN 2	Key Input 2 (Main)
70	RCV-IN	Input For Remote Control

Pin No.	Signal Name	Function
71	N.U.	Not Used
72	I2C OPEN	White Balance Adjustment Judgement
73	AFT	AFT Voltage Input
74	N.U.	Not Used
75	AGC	AGC Voltage Input
76	PROTECT 3	Power Supply Protection
77	N.U.	Not Used
78	FM-SW	Switching IF IC VCO
79	P-ON-H	Output for P-ON-H
80	N.U.	Not Used

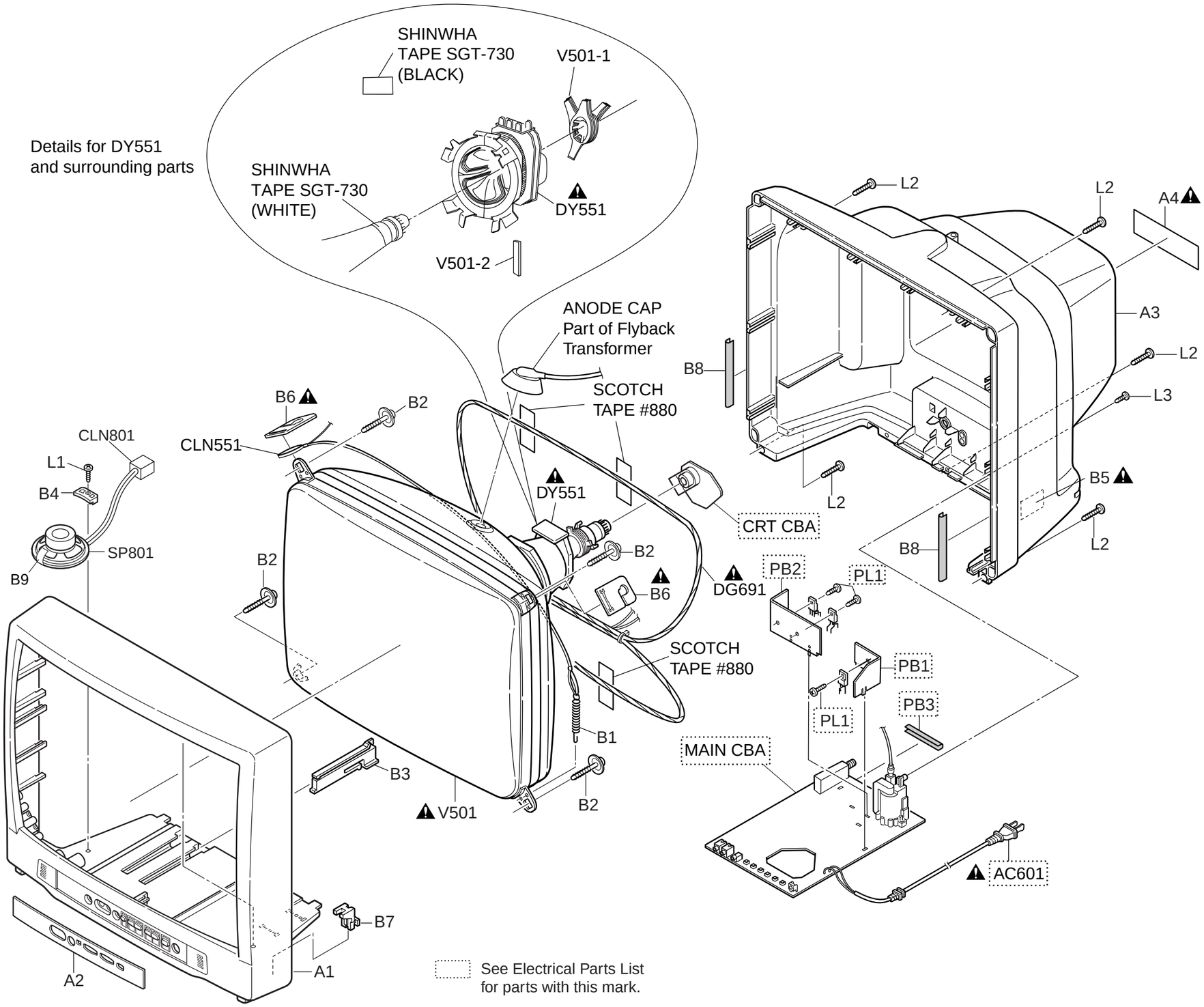
EXPLODED VIEWS

Cabinet

[ST413E]

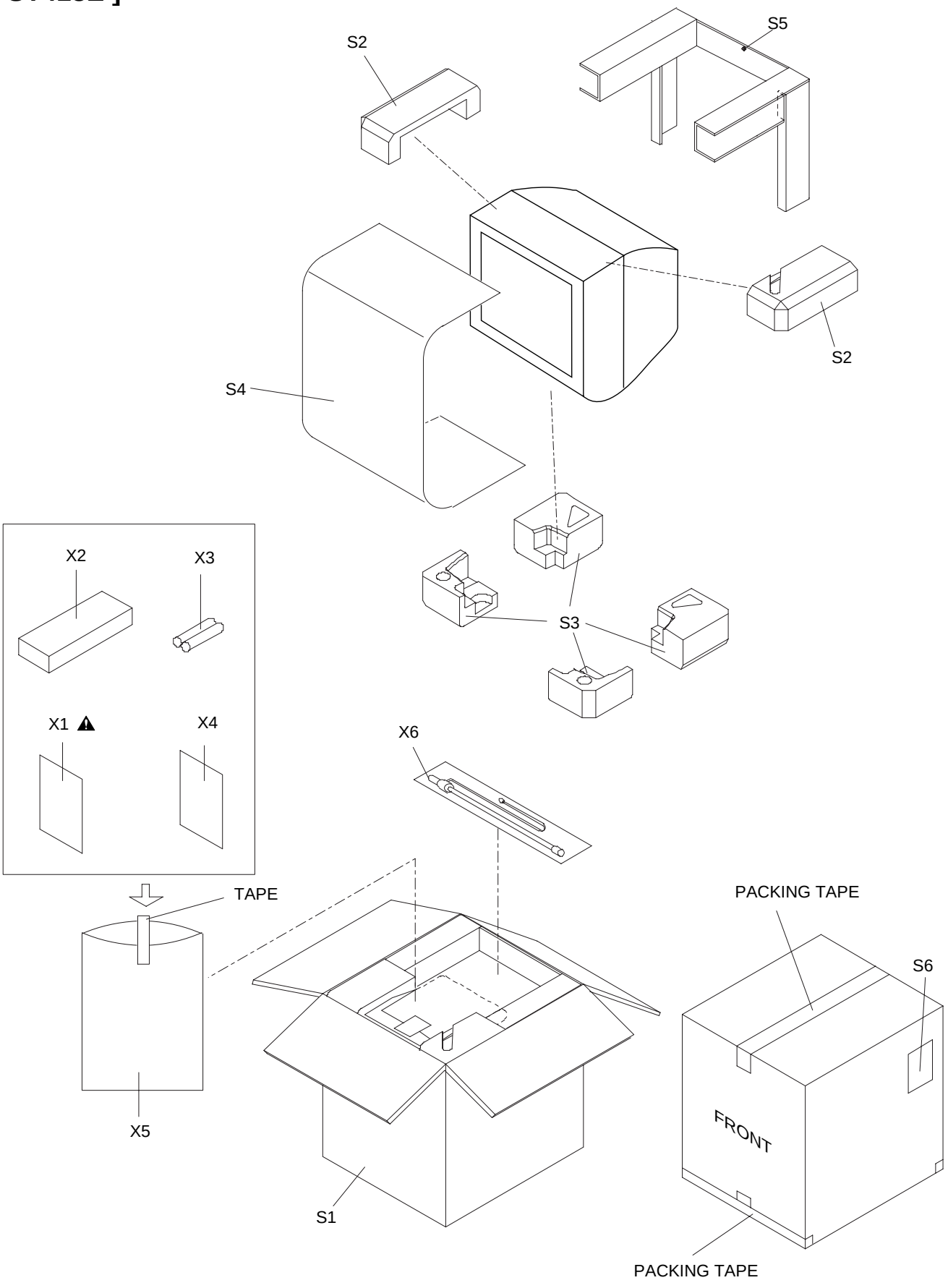


[ST419E]

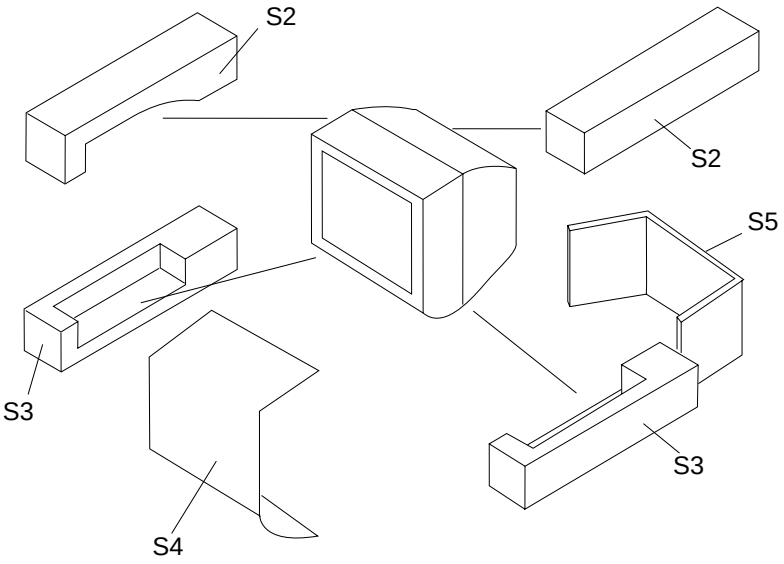

Details for DY551
and surrounding parts
SHINWHA
TAPE SGT-730
(BLACK)
V501-1
SHINWHA
TAPE SGT-730
(WHITE)
DY551
V501-2
ANODE CAP
Part of Flyback
Transformer
SCOTCH
TAPE #880
B6
B2
CLN801
CLN551
L1
B4
SP801
B9
DY551
B2
B6
B2
SCOTCH
TAPE #880
B1
B3
V501
B2
B7
A1
A2
L2
L2
A4
A3
L2
L3
B5
L2
B8
L2
CRT CBA
DG691
PB2
PL1
PB1
PB3
PL1
MAIN CBA
AC601
See Electrical Parts List
for parts with this mark.

Packing

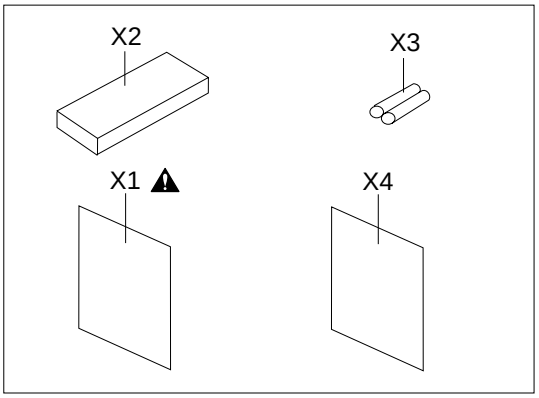
[ST413E]

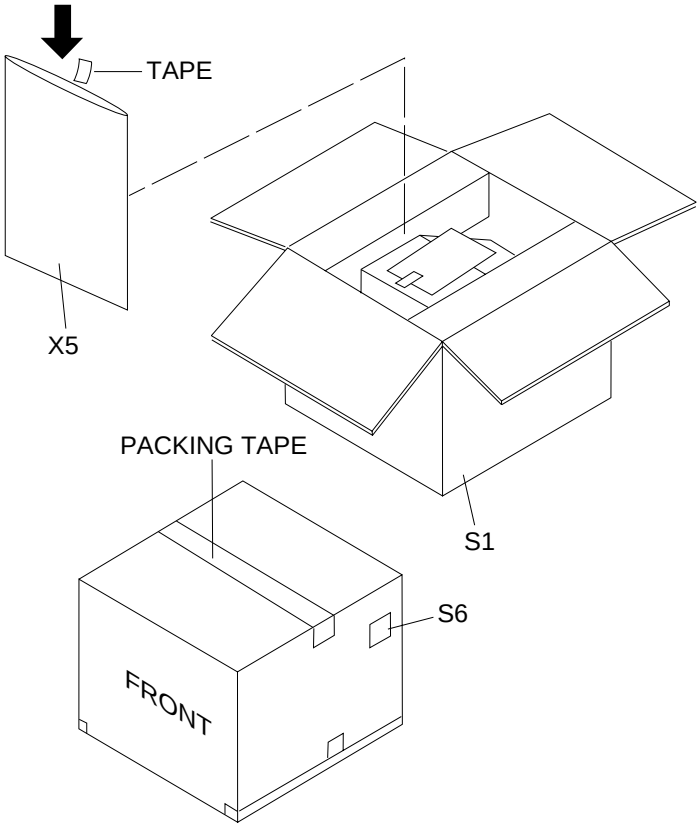


[ST419E]



Some Ref. Numbers are not in sequence.





MECHANICAL PARTS LIST

PRODUCT SAFETY NOTE: Products marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully the product safety notice in this service manual. Don't degrade the safety of the product through improper servicing.

NOTE:
Parts that are not assigned part numbers (----------) are not available.

ST413E

Ref. No.	Description	Part No.
A1	FRONT CABINET L1300UA	0EM000485
A2	CONTROL PLATE L6300UA	0EM301706
A3	REAR CABINET L6300UA or	0EM101240
	REAR CABINET L6300UA or	0EM101248
	REAR CABINET L6305UF	0EM000678
A4⚠	RATING LABEL L2200UA	---------
B1	SPRING TENSION B0080B0:EM40808	26WH006
B2	CRT MOUNTING SCREW B0030U1:K42419	8A00083
B3	PCB HOLDER L1300UA	0EM301412
B4	SPEAKER HOLDER L1300UA	0EM406030
B5⚠	LABEL CRITICAL PARTS WARNING B8007C3:EM41210	---------
CLN551	CRT GND WIRE CRT GND	WX1L7720-001
CLN801	WIRE ASSEMBLY	WX1L9200-001
DG691⚠	DEGAUSSING COIL F-017 or	LLBH00ZTM017
⚠	DEGAUSSING COIL AVDG013 or	LLBH00ZWR017
⚠	DEGAUSSING COIL or	LLBH00ZTZ017
⚠	DEGAUSSING COIL LLBH00ZTM022 or	LLBH00ZTM022
⚠	DEGAUSSING COIL AI-004-00	LLBH00Z5A006
L1	SCREW, P-TIGHT 3X12 BIND HEAD+	GBMP3120
L2	SCREW, P-TIGHT 4X18 BIND HEAD +	GBMP4180
PB4⚠	CHASISS NO. LABEL L6300UA	---------
SP801	SPEAKER S08F02B or	DSD0808XQ010
	SPEAKER J-F097-C5	DSD0808DCP01
	PACKING	
S1	CARTON L2200UA	0EM408762
S2	STYRFOAM TOP ASSEMBLY L6000UA	0EM406803
S3	STYRFOAM BOTTOM ASSEMBLY L6000UA	0EM406802
S4	SET SHEET L6000UA:700X1200	0EM407141
S5	HOLD PAD L6000UA	0EM201556
S6	SERIAL NO. LABEL L2200UA	---------
	ACCESSORIES	
X1⚠	OWNER'S MANUAL(E)/(S) L2300UA:ENGLISH/ SPANISH	0EMN02332
X2	REMOTE CONTROL 130/ERC001/N0108UD or	N0108UD
	REMOTE CONTROL 130/ERC001/N0132UD	N0132UD
X3	DRY BATTERY R6P UM3 or	XB0M451GH001
	DRY BATTERY R6P/2S or	XB0M451T0001
	DRY BATTERY(SUNRISE) R6SSE/2S or	XB0M451MS002
	DRY BATTERY R6P(AR)2PX or	XB0M451HU002
	DRY BATTERY R6P(AR)2P X ICI	XB0M451HU003
X4	SHEET RETURN STOP L6100UA	0EM407076
X5	BAG POLYETHYLENE 235X365XT0.03	0EM408420
X6	ROD ANTENNA L7720UA:NTSC W/COO or	0EMN00673
	ROD ANTENNA T5000UA	0EMN01599

Note:
1. V501 (CRT) HAS COUPLE OF SUBSTITUTIONAL PARTS AND EACH PARTS ALSO HAS MATCHING COMBINATION WITH DY551.
PLEASE SEE TABLE 1 FOR DETAILS OF MATCHING COMBINATION.
2. DY551 (DEFLECTION YOKE) HAS MATCHING COMBINATION WITH V501.
PLEASE SEE TABLE 1 FOR DETAILS OF MATCHING COMBINATION.

	CRT TYPE A	
DY551⚠	DEFLECTION YOKE KDY3GDA82X or	LLBY00ZMS011
⚠	DEFLECTION YOKE LLBY00ZSY005	LLBY00ZSY005
V501⚠	CRT A34AGT13X	TCRT190CP036
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE B	
DY551⚠	DEFLECTION YOKE LLBY00ZSY002 or	LLBY00ZSY002
⚠	DEFLECTION YOKE CDY-M1456S or	LLBY00ZQS008
⚠	DEFLECTION YOKE KDY3GC734X or	LLBY00ZMS006
⚠	DEFLECTION YOKE KDY3GCE83X or	LLBY00ZMS027
⚠	DEFLECTION YOKE DSE1493FU(S)	LLBY00ZSM008
V501⚠	CRT A34KQW42X	TCRT190SM013
V501-1	C.P.MAGNET JH225-014	XM04000BV009
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE C	
DY551⚠	DEFLECTION YOKE KDY3GD591X or	LLBY00ZMS005
⚠	DEFLECTION YOKE CDY-M1422F	LLBY00ZQS001
V501⚠	CRT A34JLL90X(W)	TCRT190QS015
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE D	
DY551⚠	DEFLECTION YOKE LLBY00ZSY003 or	LLBY00ZSY003
⚠	DEFLECTION YOKE KDY3GD592X or	LLBY00ZMS004
⚠	DEFLECTION YOKE CDY-M1455F	LLBY00ZQS007
V501⚠	CRT A34LRQ90X(VW)	TCRT190P7003
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE E	
DY551⚠	DEFLECTION YOKE LLBY00ZSY002 or	LLBY00ZSY002
⚠	DEFLECTION YOKE KDY3GC587X or	LLBY00ZMS003
⚠	DEFLECTION YOKE CDY-M1456S or	LLBY00ZQS008
⚠	DEFLECTION YOKE KDY3GCE83X	LLBY00ZMS027
V501⚠	CRT A34KPU02XX	TCRT190GS016
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE F	
DY551⚠	DEFLECTION YOKE KDY3GCB05X or	LLBY00ZMS014
⚠	DEFLECTION YOKE ST14PWRF01	LLBY00ZSAM01
V501⚠	CRT A34LEX10X	TCRT190SAM01
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
	CRT TYPE G	
DY551⚠	DEFLECTION YOKE LLBY00ZSY002 or	LLBY00ZSY002
⚠	DEFLECTION YOKE KDY3GCB82X or	LLBY00ZMS018

Ref. No.	Description	Part No.
⚠	DEFLECTION YOKE KDY3GCE83X	LLBY00ZMS027
V501⚠	CRT A34JQQ093X	TCRT190MS010
V501-1	C.P.MAGNET JH225-FN-00	XM04000BV003
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
CRT TYPE H		
DY551⚠	DEFLECTION YOKE KDY3GCE83X or	LLBY00ZMS027
⚠	DEFLECTION YOKE LLBY00ZSY002 or	LLBY00ZSY002
⚠	DEFLECTION YOKE CDY-M1456S	LLBY00ZQS008
V501⚠	CRT A34JXV70X	TCRT190THA02
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001

ST419E

Ref. No.	Description	Part No.
A1	FRONT CABINET L1400UA	0EM000479
A2	CONTROL PLATE L2300UA	0EM302011
A3	REAR CABINET L6400UA or	0EM000683
	REAR CABINET L6405UF	0EM000679
A4⚠	RATING LABEL L2300UA	---------
B1	SPRING TENSION B0080B0:EM40808	26WH006
B2	CRT MOUNTING SCREW B0030U1:K42419	8A00083
B3	PCB HOLDER L1400UA	0EM301429
B4	SPEAKER HOLDER L1400UA	0EM406026
B5⚠	LABEL CRITICAL PARTS WARNING B8007C3:EM41210	---------
B6⚠	DEGAUSS HOLDER L9800UA	0EM404845
B7	AC CORD HOLDER L1400UA	0EM406104
B8	CLOTH L9800UA:95X15XT:0.5	0EM405041
B9	CLOTH(10X30XT1.0) L9814UQ	0EM405137
CLN551	CRT GND WIRE CRT GND	WX1L7820-003
CLN801	WIRE ASSEMBLY SPEAKER WIRE(220MM)	WX1L7950-001
DG691⚠	DEGAUSSING COIL AVDG176 or	LLBH00ZWR050
⚠	DEGAUSSING COIL F-051 or	LLBH00ZTM051
⚠	DEGAUSSING COIL AI-012-00	LLBH00Z5A012
L1	SCREW, P-TIGHT 3X12 BIND HEAD+	GBMP3120
L2	SCREW, P-TIGHT 4X18 BIND HEAD +	GBMP4180
L3	SCREW TAPPING M4X14	DBU14140
SP801	SPEAKER S08F02B or	DSD0808XQ010
	SPEAKER J-F097-C5	DSD0808DCP01
PACKING		
S1	CARTON L2300UA	0EM408753
S2	STYRFOAM TOP ASSEMBLY L9814UQ	0EM405094
S3	STYRFOAM B0TTOM ASSEMBLY L6100UA	0EM406813
S4	SET SHEET L1400UA:1000X1500	0EM406680
S5	HOLD PAD L6100UA	0EM406812
S6	SERIAL NO. LABEL L2300UA	---------
ACCESSORIES		
X1⚠	OWNER'S MANUAL(E)/(S) L2300UA:ENGLISH/ SPANISH	0EMN02332
X2	REMOTE CONTROL 130/ERC001/N0108UD or	N0108UD
	REMOTE CONTROL 130/ERC001/N0132UD	N0132UD
X3	DRY BATTERY R6P UM3 or	XB0M451GH001
	DRY BATTERY R6P/2S or	XB0M451T0001
	DRY BATTERY(SUNRISE) R6SSE/2S or	XB0M451MS002
	DRY BATTERY R6P(AR)2PX or	XB0M451HU002
	DRY BATTERY R6P(AR)2P X ICI	XB0M451HU003
X4	SHEET RETURN STOP L6100UA	0EM407076
X5	BAG POLYETHYLENE 235X365XT0.03	0EM408420

Ref. No.	Description	Part No.
Note: 1. V501 (CRT) HAS COUPLE OF SUBSTITUTIONAL PARTS AND EACH PARTS ALSO HAS MATCHING COMBINATION WITH DY551. PLEASE SEE TABLE 1 FOR DETAILS OF MATCHING COMBINATION. 2. DY551 (DEFLECTION YOKE) HAS MATCHING COMBINATION WITH V501. PLEASE SEE TABLE 1 FOR DETAILS OF MATCHING COMBINATION.		
CRT TYPE A		
DY551⚠	DEFLECTION YOKE KDY3MDA84X or	LLBY00ZMS013
⚠	DEFLECTION YOKE LLBY00ZSY006 or	LLBY00ZSY006
⚠	DEFLECTION YOKE CDY-M2019F	LLBY00ZQS004
V501⚠	CRT A48JLL90X or	TCRT190QS009
⚠	CRT A48JLL90X(K)	TCRT190QS019
V501-1	C.P.MAGNET JH225-014 or	XM04000BV009
	CPM E-225-F01	XM04000ETC01
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
CRT TYPE B		
DY551⚠	DEFLECTION YOKE KDY3MCB20X or	LLBY00ZMS016
⚠	DEFLECTION YOKE 330P510A37	LLBY00ZTHA01
V501⚠	CRT A48LGS30X	TCRT190THA01
V501-1	C.P.MAGNET JH225-014 or	XM04000BV009
	CPM E-225-F01	XM04000ETC01
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
CRT TYPE C		
DY551⚠	DEFLECTION YOKE DSE-1922FU(T) or	LLBY00ZSM007
⚠	DEFLECTION YOKE TMY0301F or	LLBY00ZMS017
⚠	DEFLECTION YOKE CDY-M2023F or	LLBY00ZQS005
⚠	DEFLECTION YOKE LLBY00ZSY007	LLBY00ZSY007
V501⚠	CRT A48LRH93X(W)D or	TCRT190PTD01
⚠	CRT A48LRH93X(W)	TCRT190P7002
V501-1	C.P.MAGNET JH225-014 or	XM04000BV009
	CPM E-225-F01	XM04000ETC01
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
CRT TYPE D		
DY551⚠	DEFLECTION YOKE LLBY00ZSY008	LLBY00ZSY008
V501⚠	CRT A48LVL095X	TCRT190MS011
V501-1	C.P.MAGNET JH225-014 or	XM04000BV009
	CPM E-225-F01	XM04000ETC01
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001
CRT TYPE E		
V501⚠	CRT A48AKH13X01 K	TCRT190CP043
CRT TYPE F		
DY551⚠	DEFLECTION YOKE KDY3MDD74X	LLBY00ZMS024
V501⚠	CRT A48AKH13X	TCRT190CP044
V501-1	C.P.MAGNET JH225-014 or	XM04000BV009
	CPM E-225-F01	XM04000ETC01
V501-2	WEDGE FT-00110W or	XV10000T4001
	WEDGE DB25SR	XV10000D9001

Table 1 (V501 and DY551 Combination)

Note 1: Purity and Convergence Adjustments must be performed following CRT replacement. Refer to Electrical Adjustment Instructions.

Note 2: Please confirm CRT Type No. on the CRT Warning Label which is located on the CRT. Then See the Table 1 for V501 and DY551 combination chart.
Please refer this CRT, Deflection Yoke combination chart for parts order.

ST413E

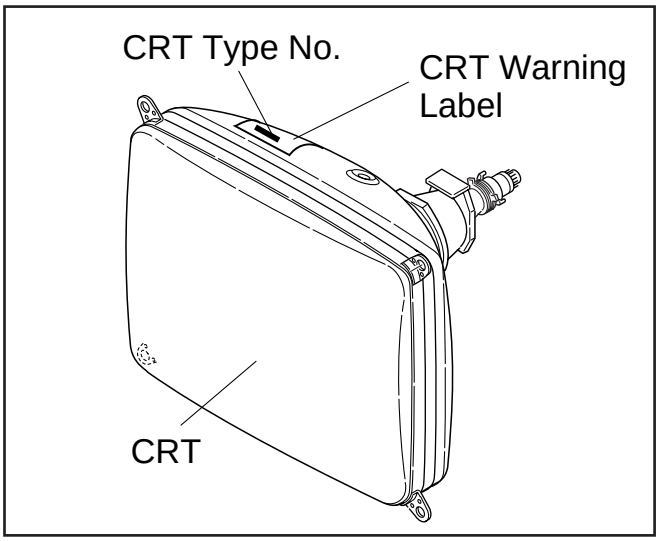
V501: CRT Type No.	V501: CRT Part No.	DY551: Deflection Yoke Part No.
CRT A34AGT13	TCRT190CP036	LLBY00ZMS011
		LLBY00ZSY005
CRT A34KQW42X	TCRT190SM013	LLBY00ZSY002
		LLBY00ZQS008
		LLBY00ZMS006
		LLBY00ZMS027
		LLBY00ZSM008
CRT A34JLL90X(W)	TCRT190QS015	LLBY00ZMS005
		LLBY00ZQS001
CRT A34LRQ90X(VW)	TCRT190P7003	LLBY00ZSY003
		LLBY00ZMS004
		LLBY00ZQS007
CRT A34KPU02XX	TCRT190GS016	LLBY00ZSY002
		LLBY00ZMS003
		LLBY00ZQS008
		LLBY00ZMS027
CRT A34LEX10X	TCRT190SAM01	LLBY00ZMS014
		LLBY00ZSAM01
CRT A34JQQ093X	TCRT190MS010	LLBY00ZSY002
		LLBY00ZMS018
		LLBY00ZMS027
CRT A34JXV70X	TCRT190THA02	LLBY00ZMS027
		LLBY00ZSY002
		LLBY00ZQS008

ST419E

V501: CRT Type No.	V501: CRT Part No.	DY551: Deflection Yoke Part No.
CRT A48JLL90X	TCRT190QS009	LLBY00ZMS013
		LLBY00ZSY006
		LLBY00ZQS004
CRT A48JLL90X(K)	TCRT190QS019	LLBY00ZMS013
		LLBY00ZSY006
		LLBY00ZQS004
CRT A48LGS30X	TCRT190PTD01	LLBY00ZMS016
		LLBY00ZTHA01
CRT A48LRH93X(W)D	TCRT190PTD01	LLBY00ZSM007
		LLBY00ZMS017
		LLBY00ZQS005
		LLBY00ZSY007
CRT A48LRH93X(W)	TCRT190P7002	LLBY00ZSM007
		LLBY00ZMS017
		LLBY00ZQS005
		LLBY00ZSY007
CRT A48LVL095X	TCRT190MS011	LLBY00ZSY008

V501: CRT Type No.	V501: CRT Part No.	DY551: Deflection Yoke Part No.
CRT A48AKH13X01 K	TCRT190CP043	---------
CRT A48AKH13X	TCRT190CP044	LLBY00ZMS024

CRT Warning Label Location



ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTE: Products marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully the product safety notice in this service manual. Don't degrade the safety of the product through improper servicing.

NOTES:

1. Parts that are not assigned part numbers (----------) are not available.
2. Tolerance of Capacitors and Resistors are noted with the following symbols.

C.....±0.25%	D.....±0.5%	F.....±1%
G.....±2%	J.....±5%	K.....±10%
M.....±20%	N.....±30%	Z.....+80/-20%

Comparison Chart of Models and Marks

Model	Mark
ST413E	A
ST419E	B

MMA CBA

Ref. No.	Mark	Description	Part No.
	A	MMA CBA	0ESA05855
	B	MMA CBA	0ESA05739
		Consists of the following	
		MAIN CBA	----------
		CRT CBA	----------

MAIN CBA

Ref. No.	Mark	Description	Part No.
		MAIN CBA Consists of the following	----------
		CAPACITORS	
C2		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C3		ELECTROLYTIC CAP. 4.7µF/50V M or	CE1JMASTL4R7
		ELECTROLYTIC CAP. 4.7µF/50V M	CE1JMASDL4R7
C31		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C32		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C34		ELECTROLYTIC CAP. 0.47µF/50V M or	CE1JMASTLR47
		ELECTROLYTIC CAP. 0.47µF/50V M	CE1JMASDLR47
C35		CHIP CERAMIC CAP. CH J 56pF/50V	CHD1JJBCH560
C36		CHIP CERAMIC CAP. B K 1000pF/50V	CHD1JKB0B102
C37		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C38		ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100
		ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C40		CHIP CERAMIC CAP. B K 0.015µF/50V	CHD1JKB0B153
C41		ELECTROLYTIC CAP. 0.47µF/50V M or	CE1JMASTLR47
		ELECTROLYTIC CAP. 0.47µF/50V M	CE1JMASDLR47
C51		CHIP CERAMIC CAP. B K 1000pF/50V	CHD1JKB0B102
C52		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C53		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C54		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C55		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C56		PCB JUMPER D0.6-P5.0	JW5.0T
C57		FILM CAP.(P) 0.047µF/50V J or	CMA1JJS00473
		FILM CAP.(P) 0.047µF/50V J	CA1J473MS029
C58		FILM CAP.(P) 0.033µF/50V J or	CMA1JJS00333
		FILM CAP.(P) 0.033µF/50V J	CA1J333MS029
C111		ELECTROLYTIC CAP. 47µF/16V M or	CE1CMASTL470
		ELECTROLYTIC CAP. 47µF/16V M	CE1CMASDL470
C112	A	ELECTROLYTIC CAP. 4.7µF/50V M or	CE1JMASTL4R7
	A	ELECTROLYTIC CAP. 4.7µF/50V M	CE1JMASDL4R7
C112	B	ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100
	B	ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C113		CHIP CERAMIC CAP. F Z 0.1µF/25V	CHD1EZB0F104
C114		FILM CAP.(P) 0.001µF/50V J or	CMA1JJS00102
		FILM CAP.(P) 0.001µF/50V J	CA1J102MS029
C115		ELECTROLYTIC CAP. 0.1µF/50V M or	CE1JMASTLR10
		ELECTROLYTIC CAP. 0.1µF/50V M or	CE1JMASDLR10
		ELECTROLYTIC CAP. 0.1µF/50V M	CE1JMASDL0R1
C116		CHIP CERAMIC CAP. CH J 220pF/50V	CHD1JJBCH221
C117		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C118		CHIP CERAMIC CAP. B K 0.015µF/50V	CHD1JKB0B153
C119		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C120		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C132		CHIP CERAMIC CAP. F Z 0.1µF/25V	CHD1EZB0F104
C133		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C151		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C152		CERAMIC CAP.(AX) B K 220pF/50V	CCA1JKT0B221
C153		CERAMIC CAP.(AX) B K 220pF/50V	CCA1JKT0B221
C155		ELECTROLYTIC CAP. 47µF/16V M or	CE1CMASTL470
		ELECTROLYTIC CAP. 47µF/16V M	CE1CMASDL470
C156		CHIP CERAMIC CAP. F Z 0.1µF/25V	CHD1EZB0F104
C301		CHIP CERAMIC CAP. CH J 120pF/50V	CHD1JJBCH121
C302		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C303		CHIP CERAMIC CAP. B K 0.015µF/50V	CHD1JKB0B153
C306		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C308		ELECTROLYTIC CAP. 0.1µF/50V M or	CE1JMASTLR10
		ELECTROLYTIC CAP. 0.1µF/50V M or	CE1JMASDLR10
		ELECTROLYTIC CAP. 0.1µF/50V M	CE1JMASDL0R1
C321		PCB JUMPER D0.6-P5.0	JW5.0T
C322		ELECTROLYTIC CAP. 0.47µF/50V M or	CE1JMASTLR47
		ELECTROLYTIC CAP. 0.47µF/50V M	CE1JMASDLR47
C323		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C324		ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100

Ref. No.	Mark	Description	Part No.
		ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C328		ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100
		ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C329		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C330		TF CAP. 0.47µF/50V J or	CT1J474MS045
		FILM CAP. 0.47µF/50V J	122Z317S
C341		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C342		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C343		CHIP CERAMIC CAP. B K 0.01µF/50V	CHD1JKB0B103
C345		ELECTROLYTIC CAP. 470µF/10V M or	CE1AMASTL471
		ELECTROLYTIC CAP. 470µF/10V M	CE1AMASDL471
C347		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C349		ELECTROLYTIC CAP. 470µF/10V M or	CE1AMASTL471
		ELECTROLYTIC CAP. 470µF/10V M	CE1AMASDL471
C351		CHIP CERAMIC CAP. CH J 100pF/50V	CHD1JJBCH101
C352		CHIP CERAMIC CAP. CH J 100pF/50V	CHD1JJBCH101
C353		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C362		ELECTROLYTIC CAP. 2.2µF/50V M or	CE1JMASTL2R2
		ELECTROLYTIC CAP. 2.2µF/50V M	CE1JMASDL2R2
C551		ELECTROLYTIC CAP. 47µF/35V M or	CE1GMASTL470
		ELECTROLYTIC CAP. 47µF/35V M	CE1GMASDL470
C552		FILM CAP.(P) 0.1µF/50V J or	CMA1JJS00104
		FILM CAP.(P) 0.1µF/50V J	CA1J104MS029
C554	A	ELECTROLYTIC CAP. 100µF/35V M or	CE1GMASTL101
	A	ELECTROLYTIC CAP. 100µF/35V M	CE1GMASDL101
C554	B	ELECTROLYTIC CAP. 470µF/35V M(VR) or	CE1GMZNTL471
	B	ELECTROLYTIC CAP. 470µF/35V M or	CE1GMZNDL471
	B	ELECTROLYTIC CAP. 470µF/35V M	CE1GMZADL471
C562		ELECTROLYTIC CAP. 2.2µF/50V M LL or	CE1JMASLL2R2
		ELECTROLYTIC CAP. 2.2µF/50V LL	CE1JMASLH2R2
C566		ELECTROLYTIC CAP. 1000µF/25V M or	CE1EMZNTL102
		ELECTROLYTIC CAP. 1000µF/25V M or	CE1EMZPDL102
		ELECTROLYTIC CAP. 1000µF/25V M	CE1EMZADL102
C568		ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100
		ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C571⚠	A	PP CAP. 0.33µF/250V J or	CT2E334MS041
⚠	A	P.P. CAP 0.33µF/200V J or	CA2D334VC012
⚠	A	METALLIZED FILM CAP. 0.33µF/200V J or	CT2D334F7001
⚠	A	METALLIZED FILM CAP. 0.33µF/200V J	CT2D334F7003
C571⚠	B	PP CAP. 0.47µF/250V J or	CT2E474MS041
⚠	B	P.P.CAP 0.47µF/200 J or	CA2D474VC012
⚠	B	METALLIZED FILM CAP. 0.47µF/200V J	CT2D474F7003
C574⚠		ELECTROLYTIC CAP. 4.7µF/250V M or	CE2EMASTL4R7
⚠		ELECTROLYTIC CAP. 4.7µF/250V M	CE2EMASDL4R7
C577⚠		ELECTROLYTIC CAP. 47µF/35V M or	CE1GMASTL470
⚠		ELECTROLYTIC CAP. 47µF/35V M	CE1GMASDL470
C578		FILM CAP.(P) 0.01µF/50V J or	CMA1JJS00103
		FILM CAP.(P) 0.01µF/50V J	CA1J103MS029
C580⚠	A	PP CAP. 0.0082µF/1.6KV J or	CT3C822MS039
⚠	A	P.P. CAP 0.0082µF/1.6K J or	CA3C822VC011
⚠	A	METALLIZED FILM CAP. 0.0082µF/1.6KV J	CT3C822F7004
C580⚠	B	PP CAP. 0.01µF/1.6KV J or	CT3C103MS039
⚠	B	P.P.CAP 0.01µF/1.6KV J or	CA3C103VC011
⚠	B	METALLIZED FILM CAP. 0.01µF/1.6KV J	CT3C103F7004

Ref. No.	Mark	Description	Part No.
C581⚠	B	CERAMIC CAP. LB 1000pF/2KV or	CA3D102KG004
⚠	B	CERAMIC CAP. BN 1000pF/2KV or	CCD3DKA0B102
⚠	B	CERAMIC CAP. 1000pF/2KV or	CA3D102PAN04
⚠	B	CERAMIC CAP RB 1000pF/2KV	CA3D102TE006
C584⚠		ELECTROLYTIC CAP. 1µF/160V M or	CE2CMASTL1R0
⚠		ELECTROLYTIC CAP. 1µF/160V M	CE2CMASDL1R0
C594⚠		ELECTROLYTIC CAP. 10µF/50V M or	CE1JMASTL100
⚠		ELECTROLYTIC CAP. 10µF/50V M	CE1JMASDL100
C601⚠		METALLIZED FILM CAP. 0.1µF/250V or	CT2E104MS037
⚠		FILM CAP.(MP) 0.1µF/250V K or	CT2E104DC011
⚠		METALLIZED FILM CAP. 0.1µF/275V K	CT2E104HJE06
C605		CERAMIC CAP. F Z 0.01µF/500V or	CCD2JZP0F103
		CERAMIC CAP. 0.01µF/AC250V or	CCD2EZA0F103
		CERAMIC CAP. E Z 0.01µF/500V	CCD2JZP0E103
C606		CERAMIC CAP. F Z 0.01µF/500V or	CCD2JZP0F103
		CERAMIC CAP. 0.01µF/AC250V or	CCD2EZA0F103
		CERAMIC CAP. E Z 0.01µF/500V	CCD2JZP0E103
C609		CERAMIC CAP. B K 1000pF/2KV or	CCD3DKD0B102
		CERAMIC CAP. B K 1000pF/2KV or	CCD3DKP0B102
		CERAMIC CAP. B K 1000pF/2KV	CA3D102MR030
C610⚠	A	ALMINIUM ELECTROLYTIC CAP150µF/ 200V or	CA2D151NC088
⚠	A	ELECTROLYTIC CAPACIT0R 150µF/200V	CA2D151S6012
C610⚠	B	ELECTROLYTIC CAP. 220µF/200V or	CA2D221NC088
⚠	B	ELECTROLYTIC CAP. 220µF/200V SL X	CA2D221S6003
C611		FILM CAP.(P) 0.068µF/50V J or	CMA1JJS00683
		FILM CAP.(P) 0.068µF/50V J	CA1J683MS029
C612		CERAMIC CAP. LB 330pF/2KV or	CA3D331KG004
		CERAMIC CAP. BN 330pF/2KV or	CCD3DKA0B331
		CERAMIC CAP. 330pF/2KV or	CA3D331PAN04
		CERAMIC CAP. RB 330pF/2KV	CA3D331TE006
C616	A	FILM CAP.(P) 0.039µF/50V J or	CMA1JJS00393
	A	FILM CAP.(P) 0.039µF/50V J	CA1J393MS029
C616	B	FILM CAP.(P) 0.056µF/50V J or	CMA1JJS00563
	B	FILM CAP.(P) 0.056µF/50V J	CA1J563MS029
C617		CERAMIC CAP.(AX) B K 330pF/50V	CCA1JKT0B331
If C642 is 0.01µF, then C643 is 0.01µF.			
C642⚠		SAFETY CAP. 10000pF/250V or	CCG2EMA0F103
⚠		SAFETY CAP. F M 0.01µF/250V or	CCG2EMP0F103
⚠		CERAMIC CAP. 0.01µF F CS	CCG2HMN0F103
C643⚠		SAFETY CAP. 10000pF/250V or	CCG2EMA0F103
⚠		SAFETY CAP. F M 0.01µF/250V or	CCG2EMP0F103
⚠		CERAMIC CAP. 0.01µF F CS	CCG2HMN0F103
If C643 is 4700pF, then JS642 (PCB JUMPER) is used.			
C643⚠		SAFETY CAP. 4700pF/250V KX	CA2E472MR050
JS642		PCB JUMPER D0.6-P7.5	JW7.5T
C650	A	CERAMIC CAP. LB 220pF/2KV or	CA3D221KG004
	A	CERAMIC CAP. BN J 220pF/2KV or	CCD3DKA0B221
	A	CERAMIC CAP. 220pF/2KV or	CA3D221PAN04
	A	CERAMIC CAP. RB 220pF/2KV	CA3D221TE006
C650	B	CERAMIC CAP. LB 470pF/2KV or	CA3D471KG004
	B	CERAMIC CAP. BN 470pF/2KV or	CCD3DKA0B471
	B	CERAMIC CAP. 470pF/2KV or	CA3D471PAN04
	B	CERAMIC CAP. RB 470pF/2KV	CA3D471TE006
C651	B	CERAMIC CAP. LB 470pF/2KV or	CA3D471KG004
	B	CERAMIC CAP. BN 470pF/2KV or	CCD3DKA0B471
	B	CERAMIC CAP. 470pF/2KV or	CA3D471PAN04
	B	CERAMIC CAP. RB 470pF/2KV	CA3D471TE006
C654⚠		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
⚠		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
⚠		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010

Ref. No.	Mark	Description	Part No.
C656⚠		ELECTROLYTIC CAP. 100µF/160V M or	CE2CMZPTL101
⚠		ELECTROLYTIC CAP. 100µF/160V M	CE2CMZNDL101
C657⚠		ELECTROLYTIC CAP. 1000µF/35V M or	CE1GMZNTL102
⚠		ELECTROLYTIC CAP. 1000µF/35V M or	CE1GMZNDL102
⚠		ELECTROLYTIC CAP. 1000µF/35V M	CE1GMZADL102
C658⚠		ELECTROLYTIC CAP. 1000µF/16V M(VR/HC) or	CE1CMZNTL102
⚠		ELECTROLYTIC CAP. 1000µF/16V M or	CE1CMZPDL102
⚠		ELECTROLYTIC CAP. 1000µF/16V M	CE1CMZADL102
C667		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASTL1R0
		ELECTROLYTIC CAP. 1µF/50V M or	CE1JMASDL1R0
		ELECTROLYTIC CAP. 1µF/50V M	CE1JMASDL010
C681		ELECTROLYTIC CAP. 470µF/10V M or	CE1AMASTL471
		ELECTROLYTIC CAP. 470µF/10V M	CE1AMASDL471
C682		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C683		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C686		ELECTROLYTIC CAP. 33µF/16V M or	CE1CMASTL330
		ELECTROLYTIC CAP. 33µF/16V M	CE1CMASDL330
C687		ELECTROLYTIC CAP. 100µF/10V M or	CE1AMASTL101
		ELECTROLYTIC CAP. 100µF/10V M	CE1AMASDL101
C692		ELECTROLYTIC CAP. 47µF/160V M or	CE2CMZPTL470
		ELECTROLYTIC CAP. 47µF/160V M W/F	CE2CMZNDL470
C701		CHIP CERAMIC CAP. CH J 100pF/50V	CHD1JJBCH101
C711		CERAMIC CAP.(AX) X K 1200pF/16V	CDA1CKT0X122
C805		ELECTROLYTIC CAP. 220µF/16V M or	CE1CMASTL221
		ELECTROLYTIC CAP. 220µF/16V M	CE1CMASDL221
C811		ELECTROLYTIC CAP. 470µF/16V M or	CE1CMASTL471
		ELECTROLYTIC CAP. 470µF/16V M	CE1CMASDL471
C821		CERAMIC CAP.(AX) X K 3300pF/16V	CDA1CKT0X332
C822		CHIP CERAMIC CAP. F Z 0.22µF/16V	CHD1CZB0F224
C823		CHIP CERAMIC CAP. F Z 0.47µF/10V or	CHD1AZB0F474
		CHIP CERAMIC CAP. F Z 0.47µF/16V	CHD1CZB0F474
CONNECTORS			
CN571		CONNECTOR BASE, 5P TV-50P-05-V3 or	J3TVC05TG002
		CONNECTOR BASE, 5P RTB-1.5-5P	J3RTC05JG001
CN691		CONNECTOR BASE, 2P TV-50P-02-V3 or	J3TVC02TG002
		CONNECTOR BASE, 2P RTB-1.5-2P	J3RTC02JG001
CN801		STRAIGHT CONNECTOR BASE 00 8283 0212 00 000 or	J383C02UG002
		STRAIGHT PIN HEADER, 2P 173981-2	1770258
DIODES			
D101		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D102		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D111		ZENER DIODE MTZJT-775.6B or	QDTB0MTZJ5R6
		ZENER DIODE DZ-5.6BSBT265	NDTB0DZ5R6BS
D131		ZENER DIODE MTZJT-775.1B or	QDTB0MTZJ5R1
		ZENER DIODE DZ-5.1BSBT265	NDTB0DZ5R1BS
D151		ZENER DIODE MTZJT-775.6B or	QDTB0MTZJ5R6
		ZENER DIODE DZ-5.6BSBT265	NDTB0DZ5R6BS
D181⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D322		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D323		ZENER DIODE MTZJT-779.1B or	QDTB0MTZJ9R1
		ZENER DIODE DZ-9.1BSBT265	NDTB0DZ9R1BS
D326		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148

Ref. No.	Mark	Description	Part No.
D350		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D351		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D352		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D551		DIODE 1N5399-B/P or	NDLZ001N5399
		RECTIFIER DIODE ERB12-06	QDQZ0ERB1206
D561⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D562⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D568⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D569⚠		ZENER DIODE MTZJT-7720B or	QDTB00MTZJ20
⚠		ZENER DIODE DZ-20BSBT265	NDTB00DZ20BS
D571		DIODE FR104-B or	NDLZ000FR104
		RECTIFIER DIODE ERA22-02 or	QDPZ0ERA2202
		DIODE 10ERB20	QDLZ010ERB20
D572⚠		RECTIFIER DIODE ERA22-02 or	QDPZ0ERA2202
⚠		DIODE 10ERB20	QDLZ010ERB20
D573⚠		PCB JUMPER D0.6-P10.0	JW10.0T
D584⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D593⚠		ZENER DIODE MTZJT-7736B or	QDTB00MTZJ36
⚠		ZENER DIODE DZ-36BSBT265	NDTB00DZ36BS
D595		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D597		ZENER DIODE MTZJT-776.8B or	QDTB0MTZJ6R8
		ZENER DIODE DZ-6.8BSBT265	NDTB0DZ6R8BS
D605⚠		DIODE 1N5399-B/P or	NDLZ001N5399
⚠		RECTIFIER DIODE ERB12-06	QDQZ0ERB1206
D606⚠		DIODE 1N5399-B/P or	NDLZ001N5399
⚠		RECTIFIER DIODE ERB12-06	QDQZ0ERB1206
D607⚠		DIODE 1N5399-B/P or	NDLZ001N5399
⚠		RECTIFIER DIODE ERB12-06	QDQZ0ERB1206
D608⚠		DIODE 1N5399-B/P or	NDLZ001N5399
⚠		RECTIFIER DIODE ERB12-06	QDQZ0ERB1206
D611		ZENER DIODE MTZJT-7715B or	QDTB00MTZJ15
		ZENER DIODE DZ-15BSBT265	NDTB00DZ15BS
D613		ZENER DIODE MTZJT-7718B or	QDTB00MTZJ18
		ZENER DIODE DZ-18BSBT265	NDTB00DZ18BS
D615⚠		SWITCHING DIODE 1N4148 T-77	QDTZ001N4148
D616⚠	B	ZENER DIODE MTZJT-7715B or	QDTB00MTZJ15
⚠	B	ZENER DIODE DZ-15BSBT265	NDTB00DZ15BS
D621		ZENER DIODE MTZJT-773.0B or	QDTB0MTZJ3R0
		ZENER DIODE DZ-3.0BSBT265	NDTB0DZ3R0BS
D641		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
D642		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D651⚠		FAST RECOVERY DIODE CA201-4 or	QDWZ00CA2014
⚠		RECOVERY DIODE ERC18-04	QDZZ0ERC1804
D652⚠		DIODE FR154	NDLZ000FR154
D653⚠		DIODE FR154	NDLZ000FR154
D654⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D657⚠		DIODE 1ZC36 or	QDQZ0001ZC36
⚠		ZENER DIODE RD39FB	QDQZ000RD39F
D658⚠	A	ZENER DIODE MTZJT-7715B or	QDTB00MTZJ15
⚠	A	ZENER DIODE DZ-15BSBT265	NDTB00DZ15BS
D660		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133

Ref. No.	Mark	Description	Part No.
		SWITCHING DIODE 1N4148	NDTZ001N4148
D661⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D662⚠		ZENER DIODE MTZJT-776.8B or	QDTB0MTZJ6R8
⚠		ZENER DIODE DZ-6.8BSBT265	NDTB0DZ6R8BS
D666		ZENER DIODE MTZJT-7736B or	QDTB00MTZJ36
		ZENER DIODE DZ-36BSBT265	NDTB00DZ36BS
D671⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D672		PCB JUMPER D0.6-P5.0	JW5.0T
D673		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
D682⚠		ZENER DIODE MTZJT-775.6B or	QDTB0MTZJ5R6
⚠		ZENER DIODE DZ-5.6BSBT265	NDTB0DZ5R6BS
D691⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D694⚠		PCB JUMPER D0.6-P5.0	JW5.0T
D811⚠		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
⚠		SWITCHING DIODE 1N4148	NDTZ001N4148
D831		SWITCHING DIODE 1SS133(T-77) or	QDTZ001SS133
		SWITCHING DIODE 1N4148	NDTZ001N4148
ICS			
IC31		IC:VIF/SIF DETECTOR M61111FP	QSZBA0SMB010
IC111⚠		IC M61271M8-058FP-71	QSZAA0RMB182
IC151		IC:MEMORY S524C20D21 or	NSZBA0SSM028
		IC:MEMORY BR24C02F-W or	QSMBA0SRM003
		IC:MEMORY BR24C02F or	QSMMA0SRM003
		IC:EEPROM CAT24WC02JI or	NSZBA0SBG001
		IC(EEP-ROM) M24C02-WMN6	NSZAA0SSS004
IC551⚠		VERTICAL OUTPUT IC LA78040A	QSBBA0SSY003
IC601⚠		PHOTOCOUPLER PS2501-1W or	QPEW0PS25011
⚠		PHOTO COUPLER PS2501-1L or	QPEL0PS25011
⚠		PHOTOCOUPLER LTV-817B-F or	NPEB0LTV817F
⚠		PHOTOCOUPLER LTV-817C-F	NPEC0LTV817F
IC801		AUDIO AMP LA4224	QSZAA0SSY005
COILS			
L1		PCB JUMPER D0.6-P5.0	JW5.0T
L3		INDUCTOR 22µH-K-5FT or	LLARKBSTU220
		INDUCTOR 22µH-K	LLARKDQKA220
L32		INDUCTOR 15µH-J-26T	LLAXJATTU150
L33		INDUCTOR 22µH-J-26T	LLAXJATTU220
L51		INDUCTOR 100µH-K-5FT or	LLARKBSTU101
		INDUCTOR 100µH-K	LLARKDQKA101
L111		PCB JUMPER D0.6-P5.0	JW5.0T
L301		INDUCTOR 100µH-K-5FT or	LLARKBSTU101
		INDUCTOR 100µH-K	LLARKDQKA101
L341		PCB JUMPER D0.6-P5.0	JW5.0T
L342		PCB JUMPER D0.6-P5.0	JW5.0T
L601⚠		LINE FILTER TLF12UA302W1R0 or	LLBG00ZTU025
⚠		LINE FILTER LF005 or	LLBG00ZLH001
⚠		LINE FILTER UU10.5-A or	LLBG00ZY2008
⚠		LINE FILTER SA-91213B or	LLBG00ZSA002
⚠		LINE FILTER 6.35MH UU10-002	LLBG00ZKV001
L692		CHOKE COIL 47µH-K	LLBD00PKV007
TRANSISTORS			
Q31		TRANSISTOR 2SC2785(F) or	QQSF02SC2785
		TRANSISTOR KTC3199(GR) or	NQS10KTC3199
		TRANSISTOR KTC3198(GR) or	NQS40KTC3198
		TRANSISTOR 2SC1815-GR(TPE2)	QQS102SC1815
Q111		TRANSISTOR 2SC2785(F) or	QQSF02SC2785

Ref. No.	Mark	Description	Part No.
		TRANSISTOR KTC3199(GR) or	NQS10KTC3199
		TRANSISTOR KTC3198(GR) or	NQS40KTC3198
		TRANSISTOR 2SC1815-GR(TPE2)	QQS102SC1815
Q321⚠		TRANSISTOR 2SC2785(F) or	QQSF02SC2785
⚠		TRANSISTOR KTC3199(GR) or	NQS10KTC3199
⚠		TRANSISTOR KTC3198(GR) or	NQS40KTC3198
⚠		TRANSISTOR 2SC1815-GR(TPE2)	QQS102SC1815
Q571⚠	A	TRANSISTOR TT2138LS-YB11 or	QQZZ00TT2138
⚠	A	TRANSISTOR 2SC5884000RF	QQZZ02SC5884
Q571⚠	B	TRANSISTOR TT2140LS-YB11 or	QQZZ00TT2140
⚠	B	TRANSISTOR 2SC5885000RF	QQZZ02SC5885
Q572		TRANSISTOR 2SC1627Y-TPE2	QQSY02SC1627
Q601⚠		MOS FET 2SK2662	QF5Z02SK2662
Q601⚠	A	FET 2SK3543	QFWZ02SK3543
Q601⚠	B	MOS FET 2SK3563	QFWZ02SK3563
Q602⚠		TRANSISTOR 2SC2120-O-TPE2 or	QQS002SC2120
⚠		TRANSISTOR 2SC2120-Y(TPE2)	QQSY02SC2120
Q662⚠		TRANSISTOR 2SC2785(F) or	QQSF02SC2785
⚠		TRANSISTOR KTC3199(GR) or	NQS10KTC3199
⚠		TRANSISTOR KTC3198(GR) or	NQS40KTC3198
⚠		TRANSISTOR 2SC1815-GR(TPE2)	QQS102SC1815
Q671⚠		TRANSISTOR 2SA1175(F) or	QQSF02SA1175
⚠		TRANSISTOR KTA1267(GR) or	NQS10KTA1267
⚠		TRANSISTOR KTA1266(GR) or	NQS40KTA1266
⚠		TRANSISTOR 2SA1015-GR(TPE2)	QQS102SA1015
Q675		TRANSISTOR 2SC2785(F) or	QQSF02SC2785
		TRANSISTOR KTC3199(GR) or	NQS10KTC3199
		TRANSISTOR KTC3198(GR) or	NQS40KTC3198
		TRANSISTOR 2SC1815-GR(TPE2)	QQS102SC1815
Q676		RES. BUILT-IN TRANSISTOR BA1F4M-T or	QQSZ00BA1F4M
		RES. BUILT-IN TRANSISTOR KRC103M	NQSZ0KRC103M
Q681		TRANSISTOR 2SC2120-O-TPE2 or	QQS002SC2120
		TRANSISTOR 2SC2120-Y(TPE2) or	QQSY02SC2120
		TRANSISTOR KTC3203(Y)	NQSY0KTC3203
Q682		TRANSISTOR 2SC2120-O-TPE2 or	QQS002SC2120
		TRANSISTOR 2SC2120-Y(TPE2) or	QQSY02SC2120
		TRANSISTOR KTC3203(Y)	NQSY0KTC3203
Q683		TRANSISTOR 2SC2120-O-TPE2 or	QQS002SC2120
		TRANSISTOR 2SC2120-Y(TPE2) or	QQSY02SC2120
		TRANSISTOR KTC3203(Y)	NQSY0KTC3203
RESISTORS			
R3		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R4		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R5		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R31		CHIP RES.(1608) 1/10W J 2.2k Ω	RRXAJB5Z0222
R32		CHIP RES.(1608) 1/10W J 390 Ω	RRXAJB5Z0391
R33		CHIP RES.(1608) 1/10W J 270 Ω	RRXAJB5Z0271
R34		CHIP RES.(1608) 1/10W J 220 Ω	RRXAJB5Z0221
R36		CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R37		CHIP RES.(1608) 1/10W J 220 Ω	RRXAJB5Z0221
R38		CHIP RES.(1608) 1/10W J 3.3k Ω	RRXAJB5Z0332
R39		CHIP RES.(1608) 1/10W J 27k Ω	RRXAJB5Z0273
R41		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R43		CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R45		CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R51		CHIP RES.(1608) 1/10W J 220k Ω	RRXAJB5Z0224
R52		CHIP RES.(1608) 1/10W J 220k Ω	RRXAJB5Z0224
R102		CHIP RES.(1608) 1/10W J 2.2k Ω	RRXAJB5Z0222
R103		CHIP RES.(1608) 1/10W J 1.8k Ω	RRXAJB5Z0182
R104		CHIP RES.(1608) 1/10W J 3.3k Ω	RRXAJB5Z0332

Ref. No.	Mark	Description	Part No.
R105		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R106		CHIP RES.(1608) 1/10W J 8.2k Ω	RRXAJB5Z0822
R111⚠		CARBON RES. 1/4W J 100 Ω	RCX4JATZ0101
R112		CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R113		CHIP RES.(1608) 1/10W J 470k Ω	RRXAJB5Z0474
R114		CHIP RES.(1608) 1/10W J 1k Ω	RRXAJB5Z0102
R115		CHIP RES.(1608) 1/10W J 2.7k Ω	RRXAJB5Z0272
R132		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R133		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R135		CHIP RES.(1608) 1/10W J 2.2k Ω	RRXAJB5Z0222
R136		CHIP RES.(1608) 1/10W J 100k Ω	RRXAJB5Z0104
R137		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R138		CHIP RES.(1608) 1/10W J 220k Ω	RRXAJB5Z0224
R139		CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R140		CHIP RES.(1608) 1/10W J 1k Ω	RRXAJB5Z0102
R141		PCB JUMPER D0.6-P5.0	JW5.0T
R151		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R155		CARBON RES. 1/4W J 100 Ω	RCX4JATZ0101
R156		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R161		CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R162		CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R163		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R164		CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R166		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R168		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R301		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R302		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R303		CHIP RES.(1608) 1/10W J 470 Ω	RRXAJB5Z0471
R321		CHIP RES.(1608) 1/10W J 470 Ω	RRXAJB5Z0471
R322		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R323⚠		CARBON RES. 1/4W J 2.2k Ω	RCX4JATZ0222
R326		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R327		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R328		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R329	A	CHIP RES.(1608) 1/10W J 39k Ω	RRXAJB5Z0393
R329	B	CHIP RES.(1608) 1/10W J 47k Ω	RRXAJB5Z0473
R330		CHIP RES.(1608) 1/10W J 1k Ω	RRXAJB5Z0102
R331		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R342		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R344		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R345		CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R346		CHIP RES.(1608) 1/10W J 2.7k Ω	RRXAJB5Z0272
R347		CHIP RES.(1608) 1/10W J 220 Ω	RRXAJB5Z0221
R348		CHIP RES.(1608) 1/10W J 27k Ω	RRXAJB5Z0273
R350		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R352		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R354		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R355	A	CHIP RES.(1608) 1/10W J 27k Ω	RRXAJB5Z0273
R355	B	CHIP RES.(1608) 1/10W J 39k Ω	RRXAJB5Z0393
R391		CHIP RES.(1608) 1/10W J 1k Ω	RRXAJB5Z0102
R392		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R393		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R551		CHIP RES.(1608) 1/10W J 4.7 Ω	RRXAJB5Z04R7
R552⚠		CARBON RES. 1/4W J 3.9 Ω	RCX4JATZ03R9
R553⚠	A	CARBON RES. 1/4W J 1 Ω	RCX4JATZ01R0
R553⚠	B	CARBON RES. 1/4W J 3.9 Ω	RCX4JATZ03R9
R554⚠	A	CARBON RES. 1/4W J 1 Ω	RCX4JATZ01R0
R554⚠	B	CARBON RES. 1/4W J 3.9 Ω	RCX4JATZ03R9
R556		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R557		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R558		CARBON RES. 1/4W J 3.3k Ω	RCX4JATZ0332

Ref. No.	Mark	Description	Part No.
R559		CARBON RES. 1/4W J 3.3k Ω	RCX4JATZ0332
R561		CHIP RES.(1608) 1/10W J 470 Ω	RRXAJB5Z0471
R562	A	CHIP RES.(1608) 1/10W J 3.3k Ω	RRXAJB5Z0332
R562	B	CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R563	A	CHIP RES.(1608) 1/10W J 10k Ω	RRXAJB5Z0103
R563	B	CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R564	A	CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R564	B	CHIP RES.(1608) 1/10W J 56k Ω	RRXAJB5Z0563
R566	A	CARBON RES. 1/4W J 2.2 Ω	RCX4JATZ02R2
R566	B	CARBON RES. 1/4W J 3.3 Ω	RCX4JATZ03R3
R567	B	CARBON RES. 1/4W J 3.3 Ω	RCX4JATZ03R3
R569⚠		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
R571⚠	A	METAL OXIDE FILM RES. 2W J 470 Ω or	RN02471ZU001
⚠	A	METAL OXIDE FILM RES. 2W J 470 Ω	RN02471DP004
R571⚠	B	METAL OXIDE FILM RES. 2W J 1k Ω or	RN02102ZU001
⚠	B	METAL OXIDE FILM RES. 2W J 1k Ω	RN02102DP004
R572⚠	B	METAL OXIDE FILM RES. 2W J 1k Ω or	RN02102ZU001
⚠	B	METAL OXIDE FILM RES. 2W J 1k Ω	RN02102DP004
R575⚠	A	CARBON RES. 1/4W J 47 Ω	RCX4JATZ0470
R575⚠	B	CARBON RES. 1/4W J 15 Ω	RCX4JATZ0150
R576⚠	A	CARBON RES. 1/4W J 47 Ω	RCX4JATZ0470
R576⚠	B	CARBON RES. 1/4W J 15 Ω	RCX4JATZ0150
R577⚠	A	PCB JUMPER D0.6-P5.0	JW5.0T
R577⚠	B	CARBON RES. 1/4W J 15 Ω	RCX4JATZ0150
R578	A	CARBON RES. 1/4W J 560 Ω	RCX4JATZ0561
R578	B	CARBON RES. 1/4W J 390 Ω	RCX4JATZ0391
R579		CHIP RES.(1608) 1/10W J 1k Ω	RRXAJB5Z0102
R581		PCB JUMPER D0.6-P5.0	JW5.0T
R583⚠	A	METAL OXIDE FILM RES. 2W J 1.8 Ω or	RN02JZLZ01R8
⚠	A	METAL FILM RES.(STRAIGHT)2W J 1.8 Ω	RN02JZPZ01R8
R583⚠	B	METAL OXIDE FILM RES. 2W J 2.7 Ω or	RN02JZLZ02R7
⚠	B	METAL OXIDE RESISTOR 2W 2.7 Ω(J)	RN02JZPZ02R7
R584⚠		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R587	A	CARBON RES. 1/4W J 100k Ω	RCX4JATZ0104
R587	B	CARBON RES. 1/4W J 270k Ω	RCX4JATZ0274
R588⚠		CARBON RES. 1/4W J 100k Ω	RCX4JATZ0104
R589	A	CARBON RES. 1/4W J 120k Ω	RCX4JATZ0124
R589	B	CARBON RES. 1/4W J 100k Ω	RCX4JATZ0104
R591⚠		CHIP RES.(1608) 1/10W J 180k Ω	RRXAJB5Z0184
R592⚠		CHIP RES.(1608) 1/10W J 100k Ω	RRXAJB5Z0104
R593⚠		CHIP RES.(1608) 1/10W J 68k Ω	RRXAJB5Z0683
R594⚠		CHIP RES.(1608) 1/10W J 100k Ω	RRXAJB5Z0104
R596		CHIP RES.(1608) 1/10W J 100 Ω	RRXAJB5Z0101
R597		CARBON RES. 1/4W J 8.2k Ω	RCX4JATZ0822
R598⚠		CARBON RES. 1/4W J 47k Ω	RCX4JATZ0473
R599⚠		CHIP RES.(1608) 1/10W J 22k Ω	RRXAJB5Z0223
R601⚠		CEMENT RES. 5W K 1.2 Ω or	RW051R2DP005
⚠		CEMENT RESISTOR 5W K 1.2 Ω or	RW051R2PG001
⚠		CEMENT RES. 3W K 1.2 Ω or	RW031R2PG007
⚠		CEMENT RESISTOR 3W K 1.2 Ω	RW031R2PAK10
R602⚠		CARBON RES. 1/4W J 820k Ω	RCX4JATZ0824
R603		CARBON RES. 1/4W J 820k Ω	RCX4JATZ0824
R611		CARBON RES. 1/4W J 270 Ω	RCX4JATZ0271
R612		CARBON RES. 1/4W J 270 Ω	RCX4JATZ0271
R613⚠	A	METAL OXIDE FILM RES. 2W J 0.47 Ω or	RN02JZLZ0R47
⚠	A	METAL RES. 2W J 0.47 Ω	RN02JZPZ0R47
R613⚠	B	METAL OXIDE FILM RES. 2W J 0.33 Ω or	RN02JZLZ0R33
⚠	B	METAL RES 2W J 0.33 Ω	RN02JZPZ0R33
R616		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R621		CARBON RES. 1/4W J 1.2k Ω	RCX4JATZ0122
R622	A	CARBON RES. 1/4W J 150 Ω	RCX4JATZ0151

Ref. No.	Mark	Description	Part No.
R622	B	CARBON RES. 1/4W J 82 Ω	RCX4JATZ0820
R624		PCB JUMPER D0.6-P5.0	JW5.0T
R653		CHIP RES.(1608) 1/10W J 15k Ω	RRXAJB5Z0153
R654	A	CARBON RES. 1/4W J 3.3k Ω	RCX4JATZ0332
R654⚠	B	CARBON RES. 1/4W J 2.7k Ω	RCX4JATZ0272
R655⚠		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R656⚠		CHIP RES.(1608) 1/10W J 15k Ω	RRXAJB5Z0153
R657⚠		CHIP RES.(1608) 1/10W J 15k Ω	RRXAJB5Z0153
R660		CARBON RES. 1/4W J 1k Ω	RCX4JATZ0102
R661⚠	A	CARBON RES. 1/4W J 180k Ω	RCX4JATZ0184
R661⚠	B	CARBON RES. 1/4W J 220k Ω	RCX4JATZ0224
R662⚠	A	CARBON RES. 1/4W J 33k Ω	RCX4JATZ0333
R662⚠	B	CARBON RES. 1/4W J 6.8k Ω	RCX4JATZ0682
R664⚠		CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R665⚠		CHIP RES.(1608) 1/10W J 4.7k Ω	RRXAJB5Z0472
R666⚠		METAL OXIDE FILM RES. 2W J 15k Ω	RN02153DP004
R667⚠		PCB JUMPER D0.6-P5.0	JW5.0T
R668⚠		METAL OXIDE FILM RES. 1W J 56k Ω	RN01563DP003
R671		CARBON RES. 1/4W J 3.3k Ω	RCX4JATZ0332
R672		CARBON RES. 1/4W J 3.3k Ω	RCX4JATZ0332
R673		CARBON RES. 1/4W J 100k Ω	RCX4JATZ0104
R675		CARBON RES. 1/4W J 22k Ω	RCX4JATZ0223
R676		CARBON RES. 1/4W J 10k Ω	RCX4JATZ0103
R681⚠		CARBON RES. 1/4W J 12 Ω	RCX4JATZ0120
R682⚠		METAL OXIDE FILM RES. 1W J 56 Ω or	RN01560ZU001
⚠		METAL OXIDE FILM RES. 1W J 56 Ω	RN01560DP003
R683⚠		METAL OXIDE FILM RES. 1W J 39 Ω or	RN01390ZU001
⚠		METAL OXIDE FILM RES. 1W J 39 Ω	RN01390DP003
R684		CARBON RES. 1/4W J 47 Ω	RCX4JATZ0470
R685		CARBON RES. 1/4W J 47 Ω	RCX4JATZ0470
R686		CARBON RES. 1/4W J 100 Ω	RCX4JATZ0101
R687		CARBON RES. 1/4W J 100 Ω	RCX4JATZ0101
R691⚠		CARBON RES. 1/4W J 15k Ω	RCX4JATZ0153
R701		CHIP RES.(1608) 1/10W J 75 Ω	RRXAJB5Z0750
R702		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R711		CHIP RES.(1608) 1/10W J 47k Ω	RRXAJB5Z0473
R712		CHIP RES.(1608) 1/10W J 3.3k Ω	RRXAJB5Z0332
R801		CARBON RES. 1/2W J 100 Ω or	RCX2JZQZ0101
		CARBON RES. 1/2W J 100 Ω	RCX2JZPZ0101
R810⚠		METAL OXIDE FILM RES. 1W J 10 Ω or	RN01100ZU001
⚠		METAL OXIDE FILM RES. 1W J 10 Ω	RN01100DP003
R811⚠		CHIP RES.(1608) 1/10W J 2.2k Ω	RRXAJB5Z0222
R812⚠		CHIP RES.(1608) 1/10W J 2.2k Ω	RRXAJB5Z0222
R821		CHIP RES.(1608) 1/10W J 15k Ω	RRXAJB5Z0153
R822		CHIP RES.(1608) 1/10W J 5.6k Ω	RRXAJB5Z0562
R831		CHIP RES.(1608) 1/10W J 470k Ω	RRXAJB5Z0474
R832		CHIP RES.(1608) 1/10W J 6.8k Ω	RRXAJB5Z0682
SWITCHES			
SW101		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02
SW102		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02
SW103		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02
SW104		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02

Ref. No.	Mark	Description	Part No.
SW105		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02
SW106		TACT SWITCH SKQSAB or	SST0101AL038
		TACT SWITCH KSM0612B or	SST0101HH003
		TACT SWITCH TC-1104(H=5.0)	SST0101DNG02
MISCELLANEOUS			
AC601⚠		AC CORD LA-2366 or	WAC0172LW006
⚠		AC CORD WAC0172AS006 or	WAC0172AS006
⚠		AC CORD A0A0280-007 or	WAC0172LTE04
⚠		AC CORD PB8K9F9110A-057	WAC0172LW008
BC101		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC571		BEAD INDUCTORS FBA04HA600VB-00	LLBF00STU026
BC601		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC602		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC651		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC652		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC653		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC691		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
BC692		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
CF31		CERAMIC TRAP 4.5MHz or	FBE455PMR003
		CERAMIC TRAP 4.5MHz	FBE455PMS002
CF32		CERAMIC FILTER SFSRA4M50CF00-B0 or	FBB455PMR004
		CERAMIC FILTER 4.5MHz	FBB455PMS001
CLN301	A	WIRE ASSEMBLY WX1L9700-104	WX1L9700-104
CLN301	B	WIRE ASSEMBLY WX1L1100-102	WX1L1100-102
F601⚠		FUSE 4A/125V 237 TYPE or	PAGJ20CAG402
⚠		FUSE STC4A125V U/CT or	PAGE20CW3402
⚠		FUSE 4.00A/125V	PAGG20CNG402
FH601		FUSE HOLDER MSF-015	XH01Z00LY001
FH602		FUSE HOLDER MSF-015	XH01Z00LY001
GP641⚠		GAP. FNR-G3.10D	FAZ000LD6005
J115		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
JK701		RCA JACK(YELLOW) MTJ-032-06B-20 or	JXRL010LY050
		RCA JACK 1P AV-8.4-9Y	JXRL010RP010
JK702		RCA JACK(WHITE) MTJ-032-06B-22 or	JXRL010LY052
		RCA JACK 1P AV-8.4-9W	JXRL010RP011
JK801		EARPHONE JACK HTJ-035-1ZEBTZ or	JYSL030GE001
		EARPHONE JACK MSJ-035-12APC	JYSL030LY001
JS112		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
JS113		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
JS601		PCB JUMPER D0.6-P5.0	JW5.0T
JS802		PCB JUMPER D0.6-P5.0	JW5.0T
PB1		HEAT SINK(PGW) L6400UZ	0EM407501
PB2	A	HEAT SINK(PGY)ASSEMBLY L6300UZ	0EM407516
PB2	B	HEAT SINK(PGX)ASSEMBLY L6400UZ	0EM407502
PB3		CLOTH(65) L7735TR:65X10X0.5T	0EM402149
PL1		SCREW, B-TIGHT M3X8 BIND HEAD+	GBMB3080
PS691⚠	A	THERMISTOR ZPB45BL7R0A	QNZZ45BL7R0A
PS691⚠	B	THERMISTOR ZPB45BL3R0A	QNBZ45BL3R0A
RCV101		REMOCON RECEIVE UNIT PIC-37042SR	USESJRSKK034
SA601⚠		SURGE ABSORBER JVR-07N471K or	NVQZVR07N471
⚠		SURGE ABSORBER CNR-10D471K or	NVQZR10D471K
⚠		SURGE ABSORBER CNR-07D471K or	NVQZR07D471K
⚠		SURGE ABSORBER PVR-07D471KB	NVQZ07D471KB
SF1		SAW FILTER SAFHM45M7VAAZ00B03	FBB456PMR010
T571⚠	A	FLYBACK TRANSFORMER JF0501-3101B or	LTF00CPXB039
⚠	A	FLYBACK TRANS BSC23-2603S or	LTF00CPS2054
⚠	A	FLYBACK TRANS BSC25-0241 or	LTF00CPP1007

Ref. No.	Mark	Description	Part No.
⚠	A	FLYBACK TRANS FNI14A001	LTF00CPSM018
T571⚠	B	FLYBACK TRANSFORMER JF0501-3201 or	LTF00CPXB044
⚠	B	FLYBACK TRANS BSC23-2631S or	LTF00CPS2060
⚠	B	FLYBACK TRANS BSC25-0243 or	LTF00CPP1008
⚠	B	FLYBACK TRANS FNI20A001	LTF00CPSM019
T572	A	H0RIZONTAL DRIVE TRANS LP2-005 or	LTH00CPA5005
	A	HORIZONTAL DRAIVE TRANS CSA-LF051	LTH00CPSA005
T572	B	H0RIZONTAL DRIVE TRANS LP2-004 or	LTH00CPA5004
	B	HORIZONTAL DRAIVE TRANS CSA-LF049	LTH00CPSA004
T601⚠	A	SWITCHING TRANS 02Y0438 or	LTT00CPKT099
⚠	A	SWITCHING TRANS CSA-SW0240A	LTT00CPSA143
T601⚠	B	SWITCHING TRANS KD-01743 or	LTT00CPKT088
⚠	B	SWITCHING TRANS CSA-SW0049	LTT00CPSA122
TP300		PCB JUMPER D0.6-P12.5	JW12.5T
TP601		PCB JUMPER D0.6-P10.0	JW10.0T
TU1		TUNER UNIT TEQH9-001A	UTUNNTUAL032
VR661⚠	A	CARBON P.O.T. 30k Ω B or	VRCB303KA011
⚠	A	CARBON P.O.T. 30k Ω B	VRCB303HH014
VR661⚠	B	CARBON P.O.T. 50k Ω B or	VRCB503KA011
⚠	B	CARBON P.O.T. 50k Ω B	VRCB503HH014
X301		X'TAL 3.579545 MHz or	FXD355LLN003
		X'TAL 3.579545MHz(30PPM)	FXD355LCHE01

CRT CBA

Ref. No.	Mark	Description	Part No.
		CRT CBA Consists of the following	----------
CAPACITORS			
C501	A	CHIP CERAMIC CAP. CH J 270pF/50V	CHD1JJBCH271
C501	B	CHIP CERAMIC CAP. CH J 330pF/50V	CHD1JJBCH331
C502		CHIP CERAMIC CAP. CH J 270pF/50V	CHD1JJBCH271
C503		CHIP CERAMIC CAP. CH J 330pF/50V	CHD1JJBCH331
C504		ELECTROLYTIC CAP. 47μF/16V M or	CE1CMASTL470
		ELECTROLYTIC CAP. 47μF/16V M	CE1CMASDL470
C510		CERAMIC CAP. B K 1000pF/2KV or	CCD3DKD0B102
		CERAMIC CAP. B K 1000pF/2KV or	CCD3DKP0B102
		CERAMIC CAP. B K 1000pF/2KV	CA3D102MR030
CONNECTOR			
CN501		PIN CONNECTOR 005P-5100	JTEA001TG001
COILS			
L501	A	INDUCTOR 150μH-J-5FT or	LLARJCSTU151
	A	INDUCTOR 150μH-K-5FT	LLARKDSKA151
L501	B	INDUCTOR 180μH-J-5FT or	LLARJCSTU181
	B	INDUCTOR 180μH-K-5FT	LLARKDSKA181
TRANSISTORS			
Q501		TRANSISTOR 2SC2482 TPE6 or	QQSZ02SC2482
		TRANSISTOR 2SC3468(E)-AE or	QQSE02SC3468
		TRANSISTOR 2SC3468(D)-AE or	QQSD02SC3468
		TRANSISTOR KTC3207	NQSZ0KTC3207
Q502		TRANSISTOR 2SC2482 TPE6 or	QQSZ02SC2482
		TRANSISTOR 2SC3468(E)-AE or	QQSE02SC3468
		TRANSISTOR 2SC3468(D)-AE or	QQSD02SC3468
		TRANSISTOR KTC3207	NQSZ0KTC3207
Q503		TRANSISTOR 2SC2482 TPE6 or	QQSZ02SC2482
		TRANSISTOR 2SC3468(E)-AE or	QQSE02SC3468
		TRANSISTOR 2SC3468(D)-AE or	QQSD02SC3468
		TRANSISTOR KTC3207	NQSZ0KTC3207

Ref. No.	Mark	Description	Part No.
RESISTORS			
R501		METAL OXIDE FILM RES. 1W J 15k Ω or	RN01153ZU001
		METAL OXIDE FILM RES. 1W J 15k Ω	RN01153DP003
R502		METAL OXIDE FILM RES. 1W J 15k Ω or	RN01153ZU001
		METAL OXIDE FILM RES. 1W J 15k Ω	RN01153DP003
R503		METAL OXIDE FILM RES. 1W J 15k Ω or	RN01153ZU001
		METAL OXIDE FILM RES. 1W J 15k Ω	RN01153DP003
R504		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R505		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R506		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R509		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R511		CHIP RES.(1608) 1/10W J 33 Ω	RRXAJB5Z0330
R512		CHIP RES.(1608) 1/10W J 33 Ω	RRXAJB5Z0330
R513		CHIP RES.(1608) 1/10W J 33 Ω	RRXAJB5Z0330
R514		CARBON RES. 1/4W J 5.6k Ω	RCX4JATZ0562
R515		CARBON RES. 1/4W J 5.6k Ω	RCX4JATZ0562
R516		CARBON RES. 1/4W J 5.6k Ω	RCX4JATZ0562
R517		CARBON RES. 1/4W J 560 Ω	RCX4JATZ0561
R518		CARBON RES. 1/4W J 560 Ω	RCX4JATZ0561
R519		CARBON RES. 1/4W J 560 Ω	RCX4JATZ0561
R521		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R522		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R523		CHIP RES.(1608) 1/10W 0 Ω	RRXAZB5Z0000
R537		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
R538		CARBON RES. 1/4W J 1.5k Ω	RCX4JATZ0152
MISCELLANEOUS			
BC501		BEAD INDUCTORS FBR07HA121TB-00	LLBF00ZTU021
CLN501	A	PARALLEL WIRE L=250 3P	WX1L1000-102
CLN501	B	PARALLEL WIRE 3P	WX1L1114-101
JK501⚠		CRT SOCKET ISMS02S	JSCC220PK003

2003-12-05

SUPPLEMENT

Symphonic SYLVANIA DURABRAND

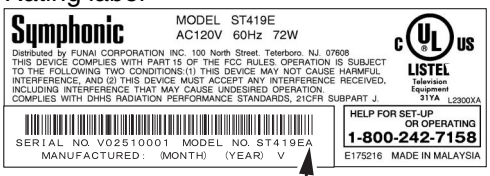
SERVICE MANUAL

Subject: Change of IF Signal Process IC

This service manual supplement is for the ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model, which are different from the previous ST413E/6413TE/DWT1304/ST419E/6419TE model. For the ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model, an "A" has been added to the end of the model number on rating label in the rear. Refer to the rating label illustration at right.

Example: ST419E

Rating label

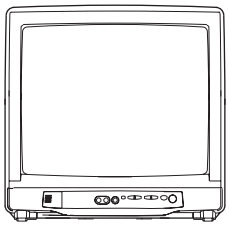

Symphonic
MODEL ST419E
AC120V 60Hz 72W
Distributed by FUNAI CORPORATION INC. 100 North Street. Teterboro, NJ. 07608
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.
COMPLIES WITH DHHS RADIATION PERFORMANCE STANDARDS, 21CFR SUBPART J.
c UL us
LISTEL
Television Equipment
31YA L2300XA
SERIAL NO. V02510001 MODEL NO. ST419EA
MANUFACTURED: (MONTH) (YEAR) V
HELP FOR SET-UP OR OPERATING
1-800-242-7158
E175216 MADE IN MALAYSIA

Suffix "A"

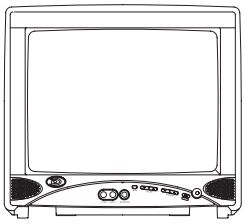
This service manual shows only the differences between the model ST413E/6413TE/DWT1304/ST419E/6419TE changed IC model and the previous ST413E/6413TE/DWT1304/ST419E/6419TE model. All other information is described in the service manual of the previous ST413E/6413TE/DWT1304/ST419E/6419TE model.

13″ COLOR TELEVISION

ST413E/6413TE

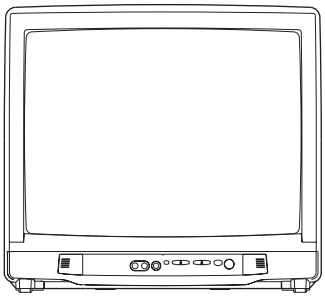


DWT1304



19″ COLOR TELEVISION

ST419E/6419TE



IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all Funai Equipment. The service procedures recommended by Funai and described in this service manual are effective methods of performing service operations. Some of these service special tools should be used when and as recommended.

It is important to note that this service manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Funai could not possibly know, evaluate and advice the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Funai has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Funai must first use all precautions thoroughly so that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

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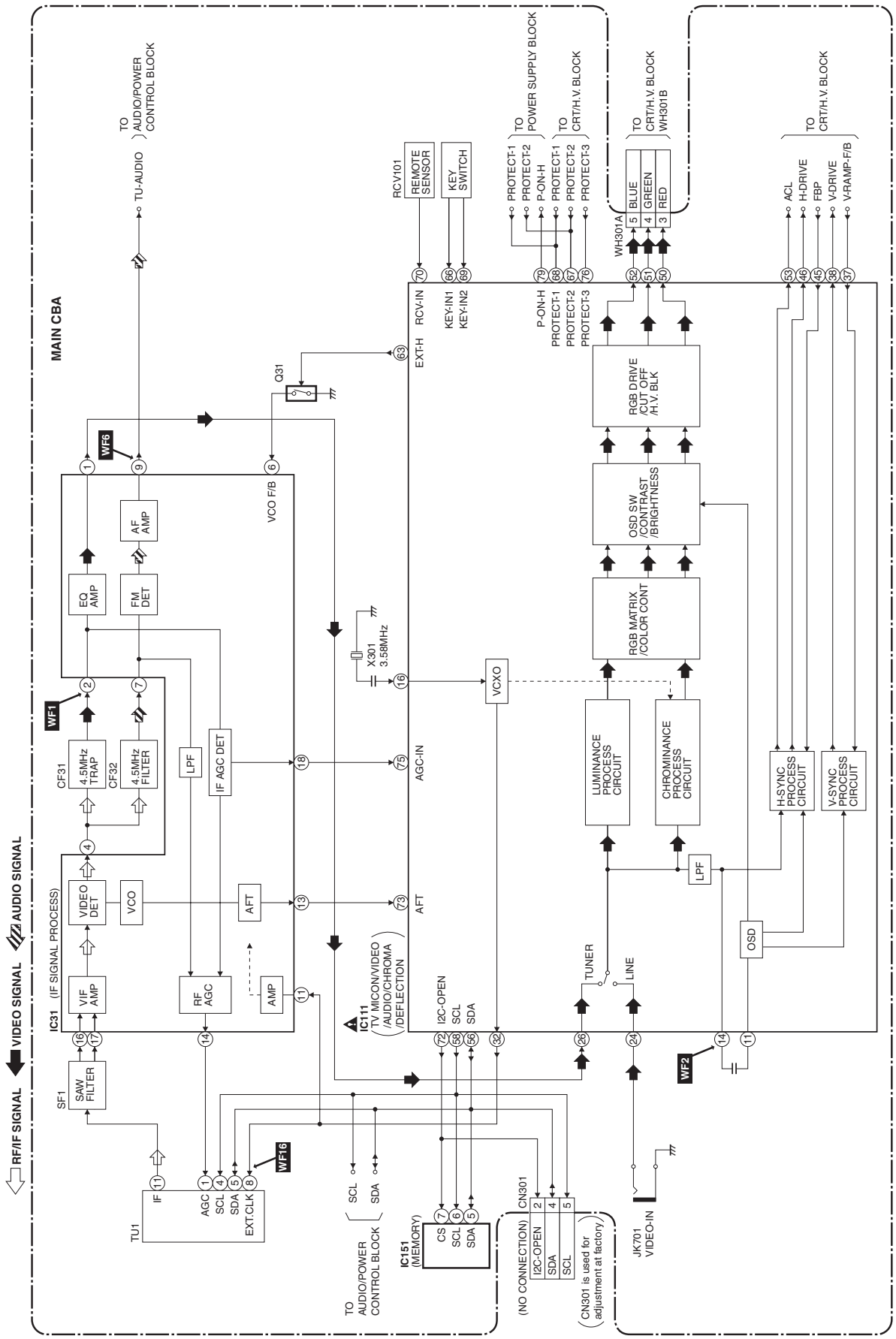
BLOCK DIAGRAMS

IF/Video/System Control Block Diagram



SCHEMATIC DIAGRAMS / CBA'S AND TEST POINTS

Standard Notes

Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by the mark " ⚠ " in the schematic diagram and the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

Note:

1. Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
2. All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
3. Resistor wattages are 1/4W or 1/6W unless otherwise specified.
4. All capacitance values are indicated in μF ($P=10^{-6}$μF).
5. All voltages are DC voltages unless otherwise specified.

Note of Capacitors:

ML --- Mylar Cap. PP --- Metallized Film Cap. SC --- Semiconductor Cap. L --- Low Leakage type

Temperature Characteristics of Capacitors are noted with the following:

B --- ±10% CH --- 0±60ppm/°C CSL --- +350~-1000ppm/°C

Tolerance of Capacitors are noted with the following:

Z --- +80~-20%

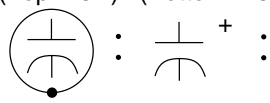
Note of Resistors:

CEM --- Cement Res. MTL --- Metal Res. F --- Fuse Res.

Capacitors and transistors are represented by the following symbols.

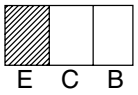
CBA Symbols

(Top View) (Bottom View)



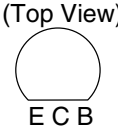
Electrolytic Capacitor

(Bottom View)



Transistor or Digital Transistor

(Top View)

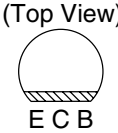


NPN Transistor

(Top View)

PNP Transistor

(Top View)



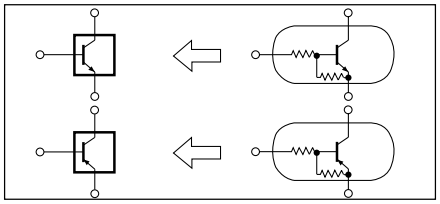
NPN Digital Transistor

(Top View)

PNP Digital Transistor

Schematic Diagram Symbols

Digital Transistor



LIST OF CAUTION, NOTES, AND SYMBOLS USED IN THE SCHEMATIC DIAGRAMS ON THE FOLLOWING PAGES:

1. **CAUTION:** FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE_A,_V FUSE.
   ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE_A,_V.

2. **CAUTION:**

   Fixed Voltage (or Auto voltage selectable) power supply circuit is used in this unit.
   If Main Fuse (F601) is blown, first check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

3. **Note:**

   (1) Do not use the part number shown on the drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since the drawings were prepared.

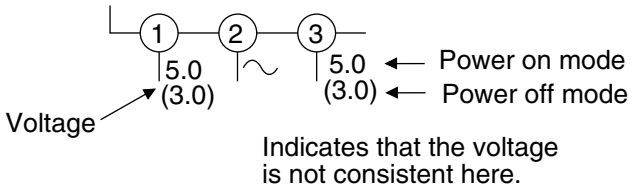
   (2) To maintain original function and reliability of repaired units, use only original replacement parts which are listed with their part numbers in the parts list section of the service manual.

4. **Wire Connectors**

   (1) Prefix symbol "CN" means "connector" (can disconnect and reconnect).

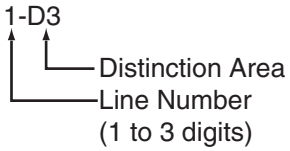
   (2) Prefix symbol "CL" means "wire-solder holes of the PCB" (wire is soldered directly).

5. **Voltage indications on the schematics are as shown below:**
   Plug the TV power cord into a standard AC outlet.:

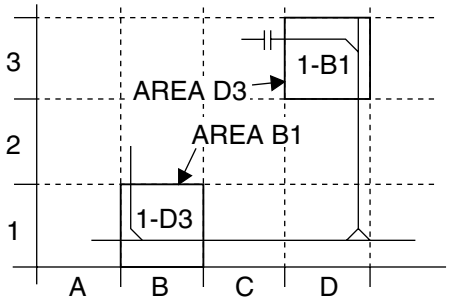


Unit: Volts

6. **How to read converged lines**



Examples:
1. "1-D3" means that line number "1" goes to the line number "1" of the area "D3".
2. "1-B1" means that line number "1" goes to the line number "1" of the area "B1".



7. **Test Point Information**

   : Indicates a test point with a jumper wire across a hole in the PCB.

   : Used to indicate a test point with a component lead on foil side.

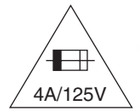
   : Used to indicate a test point with no test pin.

   : Used to indicate a test point with a test pin.

Main 2/3 Schematic Diagram

CAUTION !

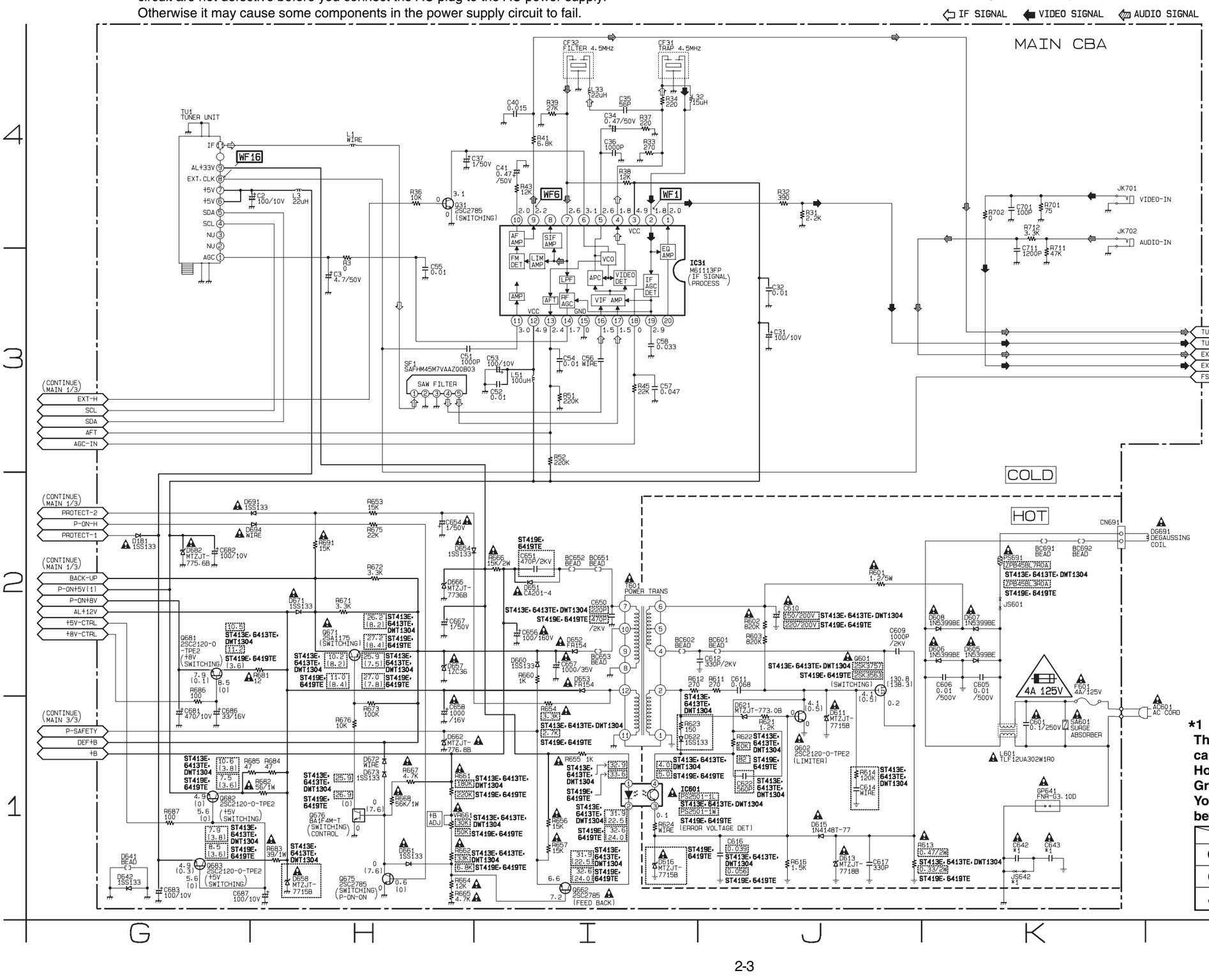
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.



CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.

ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



MAIN 2/3

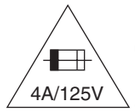
Ref No.	Position
ICS	
IC31	I-3
IC601	I-1
TRANSISTORS	
Q31	H-4
Q601	J-2
Q602	J-1
Q662	I-1
Q671	H-2
Q675	H-1
Q676	H-1
Q681	G-2
Q682	G-1
Q683	G-1
CONNECTOR	
CN691	K-2
VARIABLE RESISTOR	
VR661	H-1

***1 NOTE:**
These components (C643, C642, JS642) can be used in any models.
However, you cannot mix components under Group A with the ones under Group B.
You can choose either Group. The difference between Group A and Group B is shown below.

	Group A	Group B
C643	0.01/250V	4700P/250V
C642	0.01/250V	Not Used
JS642	Not Used	WIRE

Main CBA Top View

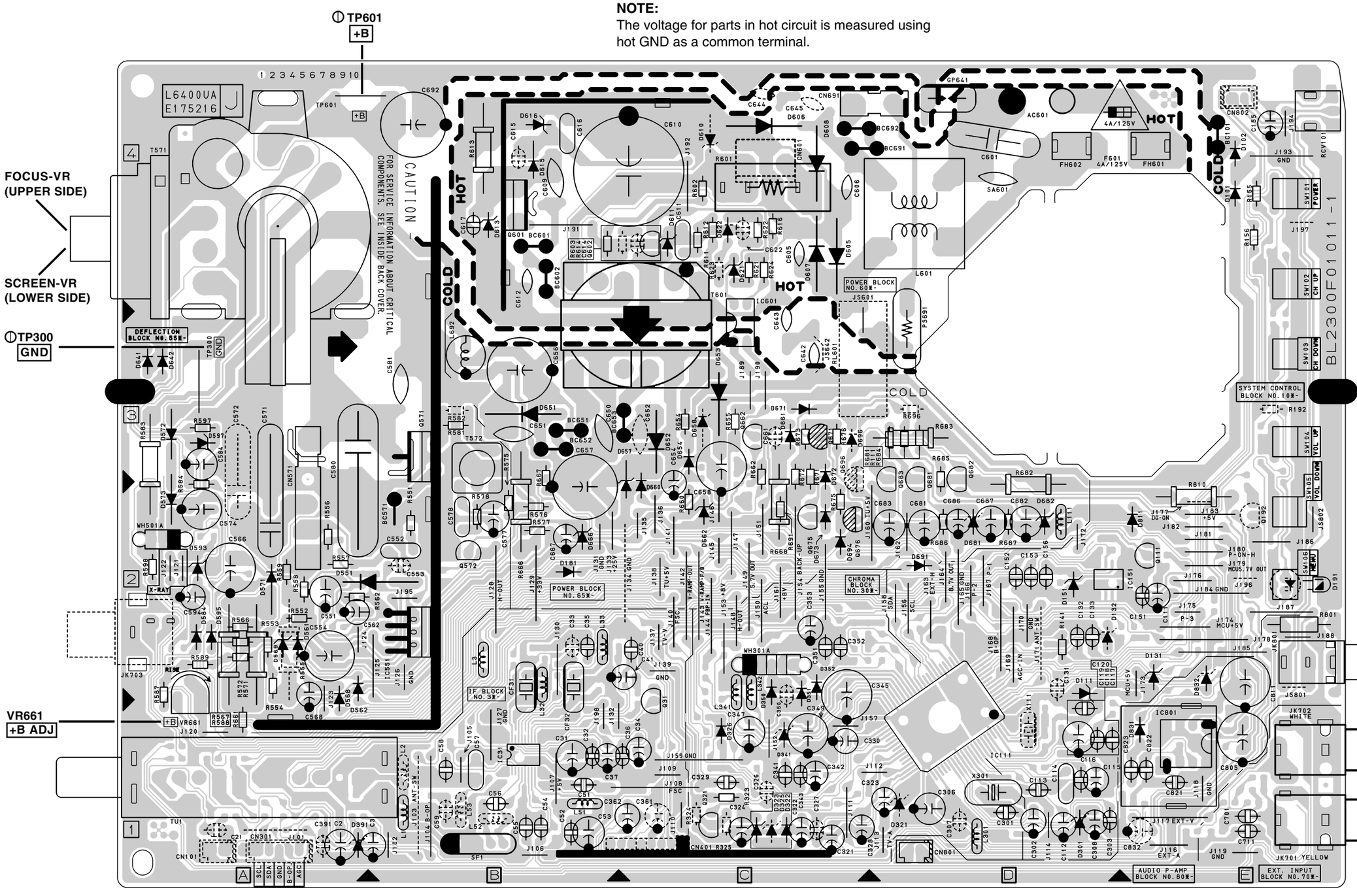
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.



CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.
ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

Because a hot chassis ground is present in the power supply circuit, an isolation transformer must be used. Also, in order to have the ability to increase the input slowly,when troubleshooting this type power supply circuit, a variable isolation transformer is required.

NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



MAIN CBA

Ref No.	Position
ICS	
IC31	B-1
IC111	D-1
IC151	E-2
IC551	B-2
IC601	C-4
IC801	E-1
TRANSISTORS	
Q31	C-1
Q111	E-2
Q321	C-1
Q571	B-3
Q572	B-2
Q601	B-4
Q602	B-4
Q662	C-3
Q671	C-3
Q675	C-2
Q676	C-2
Q681	D-3
Q682	D-3
Q683	D-3
CONNECTORS	
CN571	A-3
CN691	C-4
CN801	D-1
WH301A	C-2
WH501A	A-2
TEST POINTS	
TP300	A-3
TP601	A-4
VARIABLE RESISTOR	
VR661	A-1

Main CBA Bottom View

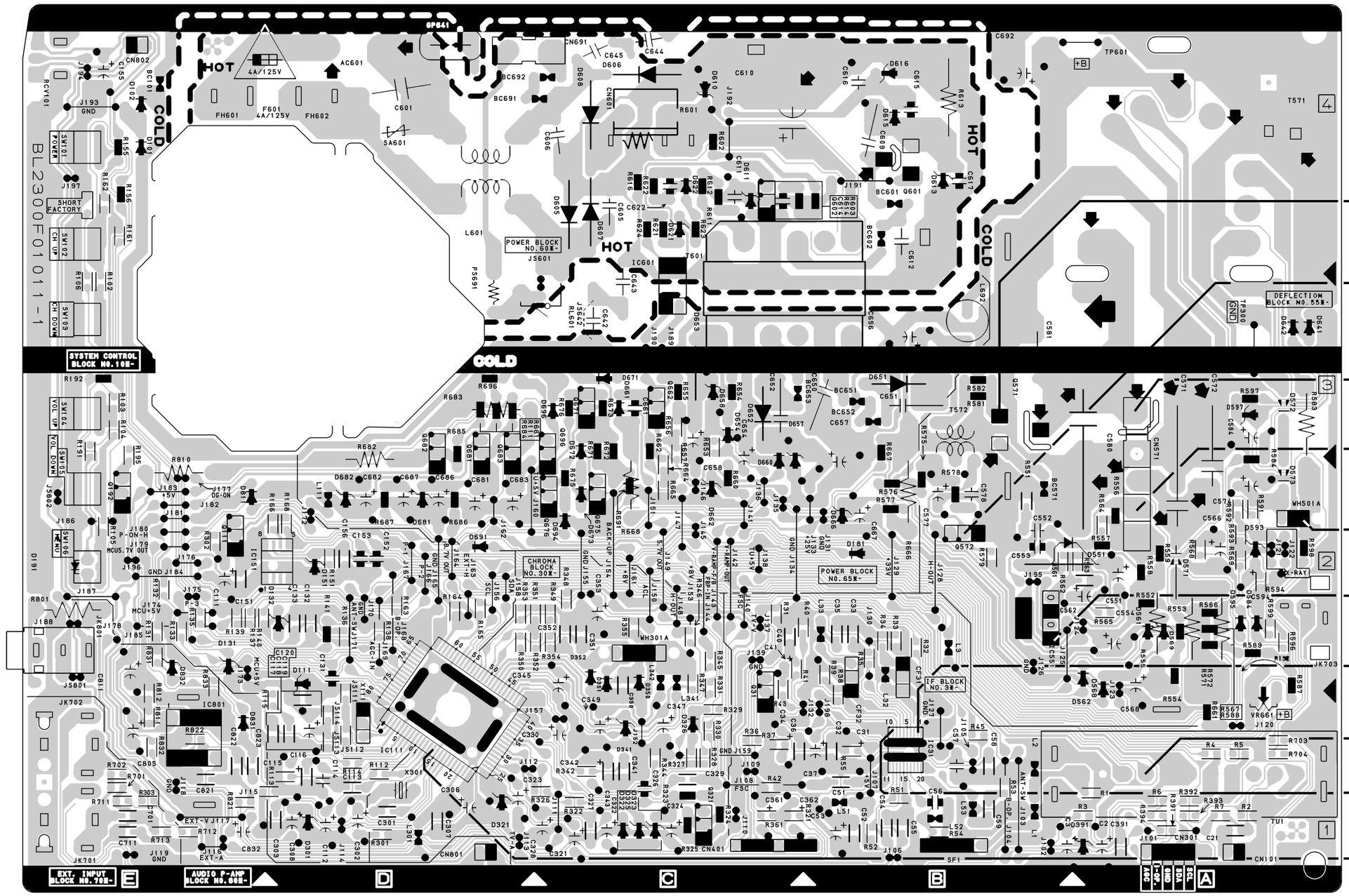
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit. If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.
ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

Because a hot chassis ground is present in the power supply circuit, an isolation transformer must be used. Also, in order to have the ability to increase the input slowly,when troubleshooting this type power supply circuit, a variable isolation transformer is required.

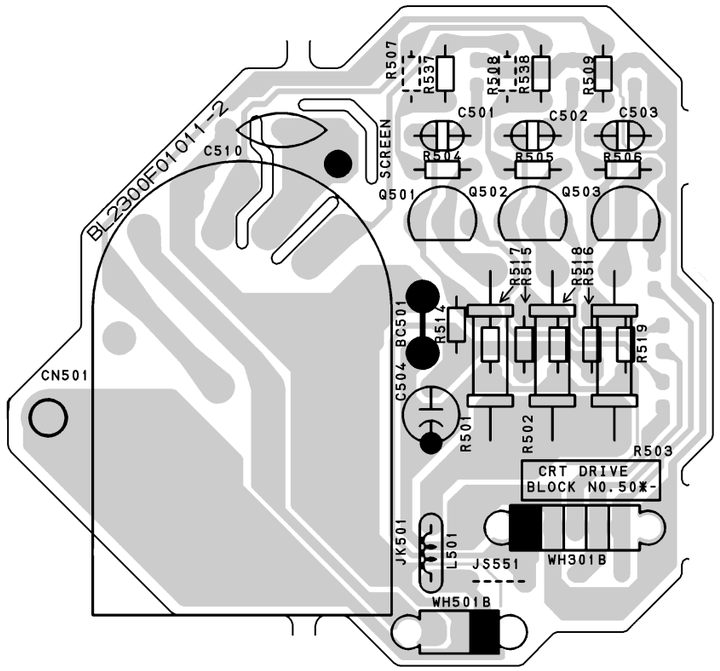
NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



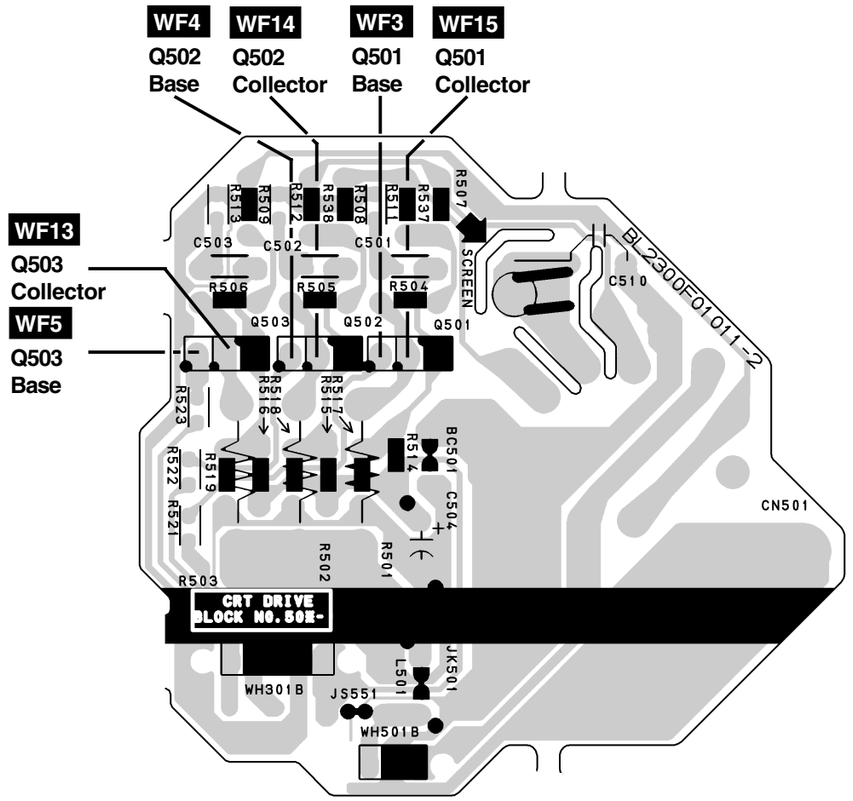
CRT CBA Top View

CRT CBA

Ref No.	Position
TRANSISTORS	
Q501	B-2
Q502	B-2
Q503	B-2
CONNECTORS	
CN501	A-1
WH301B	B-1
WH501B	B-1



CRT CBA Bottom View



ST413E changed IC model

Different parts from the previous version model (ST413E)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2200XA	----------
S6	SERIAL NO. LABEL L2200XA	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

6413TE changed IC model

Different parts from the previous version model (6413TE)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2201XB	----------
S6	SERIAL NO. LABEL L2201XB	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

DWT1304 changed IC model

Different parts from the previous version model (DWT1304)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2204XE	----------
S6	SERIAL NO. LABEL L2204XE	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05976
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

ST419E changed IC model

Different parts from the previous version model (ST419E)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2300XA	----------
S6	SERIAL NO. LABEL L2300XA	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05979
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	

6419TE changed IC model

Different parts from the previous version model (6419TE)

Ref. No.	Description	Part No.
MECHANICAL PARTS		
A4⚠	RATING LABEL L2301XB	----------
S6	SERIAL NO. LABEL L2301XB	----------
ELECTRICAL PARTS		
	MMA CBA	0ESA05979
	MAIN CBA	----------
C38	Not Used	
C609	CERAMIC CAP. B K 1000pF/2KV	CCD3DKD0B102
IC31	IC:VIF/SIF M61113FP TF0G	QSZBA0SHT035
R38⚠	CHIP RES.(1608) 1/10W J 12k Ω	RRXAJB5Z0123
R132	Not Used	